ALBERT R. MANN
LIBRARY

AT

CORNELL UNIVERSITY

CORNELL UNIVERSITY LIBRARY
3 1924 073 959 904

DATE DUE

GAYLORD PRINTED IN U.S.A.

600
M992
v.57
#1
96

MYCOTAXON

AN INTERNATIONAL JOURNAL FOR RESEARCH ON
TAXONOMY & NOMENCLATURE OF FUNGI, INCLUDING LICHENS

Volume LVII January-March 1996

CONTENTS

Check-List of Fungi from French Guiana . . . . **R. Courtecuisse, G. J. Samuels, M. Hoff, A. Y. Rossman, G. Cremers, S. M. Huhndorf and S. L. Stephenson** 1

Four New Species and Some New Records of Meliolaceous Fungi from Kenya. **R. K. Mibey, J. O. Kokwaro and D. N. Mukunya** 87

The Genus *Phaeocollybia* in South East Australia . . **Bettye J. Rees and A. E. Wood** 97

Four New Species of Corticioid Fungi (Basidiomycotina, Aphyllophorales) from Argentina . . . . **Nils Hallenberg and Kurt Hjortstam** 117

Index of Fungi Described from the Pandanaceae. **E. H. C. McKenzie and K. D. Hyde** 125

Circinella lacrymispora sp. nov. A New Mucoral Isolated from Argentine Soils. **A. M. Arambarri and M. N. Cabello** 145

A New Species of *Parmelia* (Lichenized Ascomycotina) from the Antarctic. **Dag O. Øvstedal, John A. Elix and Ronald I. Lewis Smith** 151

Calvatia complutensis sp. nov. (Lycoperdaceae, Gasteromycetes) from Spain. **G. Moreno, H. Kreisel and A. Altés** 155

Badhamia melanospora Speg. a Species Wrongly Described. **Castillo A., C. Illana and G. Moreno** 163

A New *Inocybe* (Cortinariaceae) from Kerala State, India. **K. B. Vrinda, C. K. Pradeep, A. Vijaya Joseph and T. K. Abraham** 171

Lactarius mediterraneensis, a new species from the Mediterranean Region. **J. Llistosella and F. Bellú** 175

Notes on Hyphomycetes. LXIX. Concerning *Sporidesmium maclurae* and its synonym *Cercospora maclurae*, the Causal Organism of Leaf-Blotch of Osage Orange *(Maclura pomifera)*, Reclassified in *Pseudocercospora*. **Gareth Morgan-Jones and Ryan A. Phelps** 187

Notes on Hyphomycetes. LXX. A New of *Melanographium* from India, with Comments on the Genus . . . . **Neeraj Srivastava and Gareth Morgan-Jones** 195

Notes on Hyphomycetes. LXXI. New Species of *Stenella, Stenellopsis,* and *Tretospora* from Nepal. **Ritesh K. Chaudhary, Sanjay K. Singh and Gareth Morgan-Jones** 201

Lichenostigma elongata spec. nov. (Dothideales), a Lichenicolous Ascomycete on *Libothallia* and *Aspicilia* Species . . . . . . **P. Navarro-Rosinés and J. Hafellner** 211

Coumarins Distribution in Four Truffle Species. **Bruno Tirillini and Anna Maria Stoppini** 227

Cercosporoid Fungi from South Africa . . . . **P. W. Crous and U. Braun** 233

Contribution to the Knowledge of Wood-Rotting Fungi in Brazil. II. Checklist of Fungi from Maracá Island, Roraima State. . . . . **Maria Aparecida de Jesus** 323

[Contents continued inside front cover]

ISSN 0093-4666 MYXNAE 57: 1-524 (1996)

Published quarterly by MYCOTAXON, LTD., P. O. Box 264, Ithaca, NY 14851.
For subscription details, availability in microfilm and microfiche,
and availability of articles as tear sheets, see back cover.

QK
600
M992
v.57
1996

[Contents continued from front cover]

Truffle-Like Fungi from South America: *Hysterangium* sensu lato.
Michael A. Castellano and J. J. Muchovej 329
Fungi from Palms. XXIV. The Genus *Bondiella* . . . . **Kevin D. Hyde** 347
Fungi from Palms XXV. *Pestalosphaeria elaeidis* . . . . **Kevin D. Hyde** 353
Paulia caespitosa sp. nov. and *P. wrightii* comb. nov. (Lichinaceae, Ascomycotina).
Mauro Tretiach and Aino Henssen 359
Species of Ascomycota forming Ectomycorrhizae.
Leonor C. Maia, Adriana M. Yano and James W. Kimbrough 371
Alternaria Themes and Variations (145-149) . . . . **Emory G. Simmons** 391
New and Interesting Species of *Lactarius* from Mexico Including Scanning Electron Microscope Observations.
Leticia Montoya, Victor M. Bandala and Gastón Guzmán 411
Additional New Records on *Lactarius* from Mexico.
Leticia Montoya and Victor M. Bandala 425
Notes on Conidial Fungi. III. An Interesting Species of *Polyschema* from Cuba.
R. F. Castañeda Ruiz, J. Guarro and J. Cano 451
Notes on Conidial Fungi. IV. *Hyalopleiochaeta* anam. gen. nov. and Some Notes on *Pleiochaeta*. . . . . **R. F. Castañeda Ruiz, J. Guarro and J. Cano** 457
Notes on Conidial Fungi. V. Two New Dematiaceous Hyphomycetes from Cuba.
R. F. Castañeda Ruiz, J. Guarro and J. Cano 463
Endophytic Isolates of *Creosphaeria sassafras* .
Gerald F. Bills and Fernando Peláez 471
A New Species of *Lachnum* on *Spartina alterniflora.*
Sharon A. Cantrell, Richard T. Hanlin, and Steven Y. Newell 479
Book Reviews . . . . **D. S. Hibbett** 487
Errata. 495
Author Index. 497
Index to Fungous and Lichen Taxa. 499
Reviewers. 524
Publications Date, Volume 56. 524

© Mycotaxon, Ltd., 1996

ALBERT R. MANN
LIBRARY
MAR 1 4 1996
ITHACA, N.Y. 14853

MYCOTAXON

AN INTERNATIONAL JOURNAL OF RESEARCH ON
TAXONOMY & NOMENCLATURE OF FUNGI, INCLUDING LICHENS

VOLUME LVII, 1996

COMPLETE IN ONE VOLUME
CONSISTING OF iv + 524 PAGES INCLUDING FIGURES

EDITOR-IN-CHIEF

Jean Boise Cargill
Harvard University Herbaria, 22 Divinity Ave.
Cambridge, MA 02138-2094, USA

ASSOCIATE EDITORS

David S. Hibbett
Book Review Editor
Harvard University Herbaria, 22 Divinity Ave.
Cambridge, MA 02138-2094, USA

Grégoire L. Hennebert
French Language Editor
Laboratoire de Mycologie systématique et appliquée
Université Catholique de Louvain, B-1348 Louvain-la-Neuve, Belgium

Robert Dirig
Index Editor
Bailey Hortorium, Mann Library Building
Cornell University, Ithaça, NY 14853, USA

EDITORIAL ADVISORY BOARD

AMY Y. ROSSMAN, Beltsville, Maryland (1990-95, *Chw.*)
GR´EGOIRE L. HENNEBERT, Louvain-la-Neuve, Belgium (1990-96)
JAMES W. KIMBROUGH, Gainesville, Florida (1992-97)
JACK D. ROGERS, Pullman, Washington (1993-98)
OVE ERIKSSON, Umeå, Sweden (1994-99)
RONALD H. PETERSEN, Knoxville, Tennessee (1995-2000)

Published by
MYCOTAXON, LTD.P.O.BOX 264
ITHACA, NY 14851-0264, USA

Printed in the United States of America

© Mycotaxon, Ltd., 1996

Table of Contents, Volume Fifty-Seven
January-March 1996

Check-List of Fungi from French Guiana . . . **R. Courtecuisse, G. J. Samuels, M. Hoff, A. Y. Rossman, G. Cremers, S. M. Huhndorf and S. L. Stephenson** 1

Four New Species and Some New Records of Meliolaceous Fungi from Kenya. **R. K. Mibey, J. O. Kokwaro and D. N. Mukunya** 87

The Genus *Phaeocollybia* in South East Australia. **Bettye J. Rees and A. E. Wood** 97

Four New Species of Corticioid Fungi (Basidiomycotina, Aphyllophorales) from Argentina . . . . **Nils Hallenberg and Kurt Hjortstam** 117

Index of Fungi Described from the Pandanaceae. **E. H. C. McKenzie and K. D. Hyde** 125

Circinella lacrymispora sp. nov. A New Mucoral Isolated from Argentine Soils. **A. M. Arambarri and M. N. Cabello** 145

A New Species of *Parmelia* (Lichenized Ascomycotina) from the Antarctic. **Dag O. Øvstedal, John A. Elix and Ronald I. Lewis Smith** 151

Calvatia complutensis sp. nov. (Lycoperdaceae, Gasteromycetes) from Spain. **G. Moreno, H. Kreisel and A. Altés** 155

Badhamia melanospora Speg. a Species Wrongly Described. **Castillo A., C. Illana and G. Moreno** 163

A New *Inocybe* (Cortinariaceae) from Kerala State, India. **K. B. Vrinda, C. K. Pradeep, A. Vijaya Joseph and T. K. Abraham** 171

Lactarius mediterraneensis, a new species from the Mediterranean Region. **J. Llistosella and F. Bellú** 175

Notes on Hyphomycetes. LXIX. Concerning *Sporidesmium maclurae* and its synonym *Cercospora maclurae,* the Causal Organism of Leaf-Blotch of Osage Orange *(Maclura pomifera),* Reclassified in *Pseudocercospora.* **Gareth Morgan-Jones and Ryan A. Phelps** 187

Notes on Hyphomycetes. LXX. A New of *Melanographium* from India, with Comments on the Genus. **Neeraj Srivastava and Gareth Morgan-Jones** 195

Notes on Hyphomycetes. LXXI. New Species of *Stenella, Stenellopsis,* and *Tretospora* from Nepal. **Ritesh K. Chaudhary, Sanjay K. Singh and Gareth Morgan-Jones** 201

Lichenostigma elongata spec. nov. (Dothideales), a Lichenicolous Ascomycete on *Libothallia* and *Aspicilia* Species. **P. Navarro-Rosinés and J. Hafellner** 211

Coumarins Distribution in Four Truffle Species. **Bruno Tirillini and Anna Maria Stoppini** 227

Cercosporoid Fungi from South Africa . . . . **P. W. Crous and U. Braun** 233

Contribution to the Knowledge of Wood-Rotting Fungi in Brazil. II. Checklist of Fungi from Maracá Island, Roraima State . . . . . . **Maria Aparecida de Jesus** 323

Truffle-Like Fungi from South America: *Hysterangium* sensu lato. **Michael A. Castellano and J. J. Muchovej** 329

Fungi from Palms. XXIV. The Genus *Bondiella* . . . . **Kevin D. Hyde** 347

Fungi from Palms XXV. *Pestalosphaeria elaeidis*. . . . . **Kevin D. Hyde** 353

Paulia caespitosa sp. nov. and *P. wrightii* comb. nov. (Lichinaceae, Ascomycotina). **Mauro Tretiach and Aino Henssen** 359

Species of Ascomycota forming Ectomycorrhizae. **Leonor C. Maia, Adriana M. Yano and James W. Kimbrough** 371

Alternaria Themes and Variations (145-149). . . . . **Emory G. Simmons** 391

New and Interesting Species of *Lactarius* from Mexico Including Scanning Electron Microscope Observations. **Leticia Montoya, Victor M. Bandala and Gastón Guzmán** 411

Additional New Records on *Lactarius* from Mexico.
Leticia Montoya and Victor M. Bandala 425
Notes on Conidial Fungi. III. An Interesting Species of *Polyschema* from Cuba.
R. F. Castañeda Ruiz, J. Guarro and J. Cano 451
Notes on Conidial Fungi. IV. *Hyalopleiochaeta* anam. gen. nov. and Some Notes on *Pleiochaeta* . . . . **R. F. Castañeda Ruiz, J. Guarro and J. Cano** 457
Notes on Conidial Fungi. V. Two New Dematiaceous Hyphomycetes from Cuba.
R. F. Castañeda Ruiz, J. Guarro and J. Cano 463
Endophytic Isolates of *Creosphaeria sassafras* .
Gerald F. Bills and Fernando Peláez 471
A New Species of *Lachnum* on *Spartina alterniflora.*
Sharon A. Cantrell, Richard T. Hanlin, and Steven Y. Newell 479
Book Reviews . . . . **D. S. Hibbett** 487
Errata 495
Author Index 497
Index to Fungous and Lichen Taxa 499
Reviewers 524
Publications Date, Volume 56. 524

MYCOTAXON

Volume LVII, pp. 1-85 January-March 1996

CHECK-LIST OF FUNGI FROM FRENCH GUIANA

"Studies in the Flora of the Guianas n° 80"

R. Courtecuisse (1), **G.J. Samuels** (2), **M. Hoff** (3), **A.Y. Rossman** (2),
G. Cremers (4), **S.M.Huhndorf** (5) & **S.L.Stephenson** (6)
(1) Dépt. Botanique, Fac. Sciences Pharmaceutiques et Biologiques, BP 83, F-59006 Lille Cedex
(2) USDA-ARS, Systematic Botany & Mycology Laboratory, Rm.304, B-011A, BARC-West,
10300 Baltimore Avenue, Beltsville, Md.20705, USA
(3) ORSTOM; 21, rue d'Ottrot; F-67200 Strasbourg
(4) Herbier du Centre ORSTOM de Cayenne, BP 165, F-97323 Cayenne cedex
(5) Dept. of Botany, Field Museum of Natural History, Chicago, Il.60605-2496, USA
(6) Fairmont State College, Biology, Fairmont, West Virginia 26554 USA

Abstract: A preliminary list of the fungi known from French Guiana is presented. The list is drawn from herbarium specimens and from literature citations. 625 taxa are listed with herbarium references, collecting and some bibliographic information. Two new combinations are introduced : *Galerina pectinata* (Saccardo) Courtec. and *Cotylidia spectabilis* (Léveillé) Courtec.

Résumé: Les auteurs présentent une liste préliminaire des champignons connus en Guyane française. Le matériel d'herbier et les données de la littérature ont été examinés. 625 taxa sont énumérés, avec indications complètes sur les échantillons d'herbier, les lieux de récolte et des informations bibliographiques. Deux combinaisons nouvelles sont introduites : *Galerina pectinata* (Saccardo) Courtec. et *Cotylidia spectabilis* (Léveillé) Courtec.

Table of contents :

Introduction 2
Enumeration of the taxa : 3
- A - Myxomycetes 3
- B - *Deuteromycota* (Fungi Imperfecti) 7
- C - *Ascomycotina* ('Ascomycetes') 9
  - C1 - *Loculoascomycetideae* 9
  - C2 - *Pyrenomycetideae* 16
  - C3 - *Pezizomycetideae* ('Discomycetes') 40
    - C3a - Inoperculate Discomycetes 40
    - C3b - Operculate Discomycetes 42
- D - *Basidiomycotina* ('Basidiomycetes') 43
  - D1 - Phragmobasidiomycetes and other 'Heterobasidiomycetes' 43
  - D2 - Homobasidiomycetes 45
    - D2a - *Aphyllophoromycetideae* ('Aphyllophorales' s.l.) 45
    - D2b - *Agaricomycetideae* ('Agaricales' s.l.) 54
    - D2c - *Gasteromycetideae* ('Gasteromycetes') 64
- E - *Incertae sedis* 66

Doubtful species 67

Index of generic names 69
Epithetons index 73
Acknowledgments 81
Bibliography 81

INTRODUCTION

The Guianas (French Guiana, Guyana, Suriname) area among the most poorly collected countries for fungi in the Neotropics. Historically, the Guianas are of importance because some of the oldest mycological names are based upon guianese collections. Berkeley and Curtis (1853) reported on a small collection of fungi from Suriname, while the first major mycological work done for South America was Montagne's (1855) enumeration of the collections by Leprieur made in what is now French Guiana. Stevens (1918) described leaf-inhabiting ascomycetes and fungi imperfecti chiefly from British Guiana (now Guyana). No local mycologists are active in any of the Guianas today and there has not been dedicated mycological field work done in the Guianas between the years 1918 and 1985.

Prior to 1985, myclogical collecting in the Guianas has been primarily undertaken by non mycologists who collected fungi incidentally or as an avocation. The phanaerogamic botanist Bassett Maguire, who was active between 1944 and 1983, collected many fungi in Guyana and Suriname. These collections were enumerated by Rogerson et al. (1990). The French chemist H. Jacquemin collected as a hobby in the Saül area of French Guiana in the late 1970's and early 1980's. His 250 collections, which are preserved in the ORSTOM herbarium at Cayenne (CAY), have not been critically examined nor cited in the literature.

Professional mycologists have made extensive collections in the Guianas since 1985. G.J. Samuels and J.R. Boise collected approximately 2,000 specimens of all groups of fungi in French Guiana in 1986, and in 1987 and 1989 Samuels collected approximately 1,500 specimens in French Guiana and Guyana. These collections are deposited at the New York Botanical Garden (NY), with duplicates at CAY and the herbarium of the University of Guyana in Georgetown (BRG), respectively. A.Y. Rossman collected approximately 500 specimens of all groups of fungi in the Saül area in 1986; her collections are deposited at the United States National Fungus Collections (BPI) with duplicates at CAY; aagarics identified by D.N. Pegler have been retained in part at K. R. Courtecuisse made about 700 collections in the Nouragues-Arataye area of French Guiana in 1988. These specimens are deposited in the University of Lille herbarium, with duplicates of the published collections at PC. S.M. Huhndorf collected approximately 400 specimens of all groups of fungi in the Saül area in 1994. Her collections are deposited at NY with duplicates at the Field Museum (F).

Several publications have resulted in whole or in part from recent collecting efforts. These include: Boise 1987, Brayford & Samuels 1993, Courtecuisse 1989, 1991, Courtecuisse & Buyck 1991, Courtecuisse & Lowy 1990, Huhndorf 1993, Hyde 1988, 1992, Rogers & Samuels 1987a, Rogerson & Samuels 1989, 1992, Samuels 1989a, Samuels & Nirenberg 1989, Samuels & Rogerson 1989, Samuels & Seifert 1991, Samuels & al. 1991.

In the current work, we present a list of the fungi from French Guiana that have been determined thus far. We also call attention to the great number of recent collections of all groups of fungi collected in the area a nd deposited at BPI, CAY, NY and Lille University

Herbarium, that are available for study. The authors will be pleased to provide lists of specimens, broken down by group (e.g. polypores, 'jelly fungi'). Of the approximatively 4,000 collections that have been deposited from French Guiana, about 1,000 have been identified to the species level. The identified collections include 625 taxa in 274 genera.

The following list does not include lichenized fungi. Several publications about lichens have been based on guianese lichens, chiefly the lichens of Guyana. For references to the lichens of the Guianas, see Sipman & Aptroot (1992) ; see also Rogerson & al. (1990) for a list of fungi and lichens of the Guayana Highland, including records from Guyana, Surinam and Venezuela.

In the following list, species are listed alphabetically within the families in the following major groups : Myxomycetes, Fungi Imperfecti, Ascomycetes, Basidiomycetes and *incertae sedis*. For each taxon, the list of examined specimens is included indicating the collector's name, herbarium number, determinator's name, and the year of determination, collecting locality. The locality is indicated, where possible, in two parts. The first one represents the exact place (mention 'same loc.' indicates that it is the same than for preceeding specimen), the second the geographical area (with eventually 'same area' if identical with the preceeding collection). Records of species known only from the literature are indicated by * before the fungus' name, and the reference is given.

Senior author of this paper will welcome any addition concerning mycology in French Guiana, in taxonomical section and in bibliography as well. Furthermore, supplements to this first list are expected in a near future, lots of collections being under current processing.

ENUMERATION OF THE TAXA

A - MYXOMYCETES

CERATIOMYXACEAE

Ceratiomyxa Schroeter

Ceratiomyxa fruticulosa (Müller)McBride

-*Courtecuisse R.* RC/GF88.249 [Courtecuisse R. 1988] : Saut Pararé ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.277 [Courtecuisse R. 1988] : same loc. - *Rossman A.Y., Feuillet C. & Skog L.E.* 2841 [Farr M.L. 1987] : Montagne de Kaw. -*Rossman A.Y.* 3335 [Farr M.L.] : Rémiré - 15 km from Cayenne - Trail to Vidal old farm. -*Samuels G.J. & Boise J.R.* 2693a [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5846 [Stephenson S.L. 1992] : Roche Koutou - Marouini river high basin.

Ceratiomyxa sphaerosperma Boedijn

-*Samuels G.J. & Boise J.R.* 2952 [Farr M.L. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3406 [Stephenson S.L. 1994] : same loc.

CRIBRARIACEAE

Cribraria Persoon

Cribraria costata Dhillon & Nannenga-Bremekamp

-*Courtecuisse R.* RC/GF88.392 [Meyer M. 1991] : Saut Pararé ; Arataye River - Approuague basin.

Cribraria microcarpa (Schrader)Persoon

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 6108 [Stephenson S.L. 1992] : Monpé Soula - Marouini river high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5637 [Stephenson S.L. 1992] : Ouman fou Langa Soula - same area.

Dictydium Schrader

Dictydium cancellatum (Batsch)Mcbride

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 6074 [Stephenson S.L. 1992] : Monpé Soula - Marouini river high basin.

DIDYMIACEAE

Didymium Schrader

Didymium iridis (Ditmar)Fries

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3014 [Farr M.L. 1987] : Layon Galbao - Saül area.

PHYSARACEAE

Craterium Trent.

Craterium leucocephalum (Persoon)Ditmar

-*Samuels G.J. & Boise J.R.* 3226 [Stephenson S.L. 1992] : Bourg de Saül - Saül area.

Craterium paraguayense (Spegazzini)G.Lister

-*Samuels G.J. & Boise J.R.* 3134 [Stephenson S.L. 1992] : Bourg de Saül - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5848 [Stephenson S.L. 1992] : Roche Koutou - Marouini river high basin.

Fuligo Haller

*****Fuligo septica*** (Linné)Wiggers

- Leprieur 849 ; cited in Montagne 1854 (sub nom. *Aethalium*) ; Farr 1976:111

Physarella Peck

Physarella oblonga (Berkeley & Curtis)Morgan

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5971 [Stephenson S.L. 1992] : Ouman fou Langa Soula - Marouini river high basin.

Physarum Persoon

*****Physarum bivalve*** Persoon

-cited in Farr 1976:125

Physarum bogoriense Raciborski

-*Samuels G.J.* 3557 [Stephenson S.L. 1992] : Montagne boeuf mort - Saül area.

Physarum compressum Albertini & Schweinitz

-*Samuels G.J.* 3420 [Stephenson S.L. 1992] : Montagne La Fumée - Saül area.

Physarum globuliferum (Bulliard)Persoon

-*Samuels G.J. & Boise J.R.* 3369 [Stephenson S.L. 1994] : Toward Mont Galbao - Saül area.

Physarum javanicum Raciborski

-*Samuels G.J. & Searwar P.* 3071 [Farr M.L. 1986] : Mont Galbao - Saül area.

Physarum nucleatum Rex

-*Samuels G.J.* 3939 [Farr M.L. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 4003 [Stephenson S.L. 1992] : same loc. -*Samuels G.J. & Searwar P.* 4117 [Farr M.L. 1986] : Camp minier Paul Isnard - Paul Isnard area.

Physarum nutans Persoon

-*Samuels G.J. & Boise J.R.* 3370 [Stephenson S.L. 1992] : Bourg de Saül - Saül area.

Physarum penetrale Rex

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5944 [Stephenson S.L. 1992] : Ouman fou Langa Soula - Marouini river high basin.

Physarum stellatum (Massee)Martin

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 6047 [Stephenson S.L. 1992] : Monpé Soula - Marouini river high basin.

Physarum viride (Bulliard)Persoon

-*Samuels G.J.* 3881 [Farr M.L. 1986] : Piste de Saint-Elie. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5972 [Stephenson S.L. 1992] : Ouman fou Langa Soula - Marouini river high basin.

RETICULARIACEAE

Lycogala Adanson

Lycogala epidendron (Linné)Fries

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5902 [Stephenson S.L. 1992] : Roche Koutou - Marouini river high basin.

Lycogala exiguum Morgan

-*Samuels G.J. & Searwar P.* 4095 [Farr M.L. 1986] : Camp minier Paul Isnard - Paul Isnard area.

Tubifera J.F. Gmelin

Tubifera bombarda (Berkeley & Broome)Martin

-*Samuels G. & Feuillet C.* 4464 [Farr M.L. 1986] : Montagne de Kaw.

****Tubifera ferruginosa*** (Batsch) J.F.Gmelin

-cited in Farr 1976:31

Tubifera microsperma (Berkeley & Curtis)Martin

-*Rossman A.Y. & Feuillet C.* 3138 [Farr M.L.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm.

STEMONITACEAE

Comatricha Preuss

Comatricha longa Peck

-*Samuels G. & Feuillet C.* 4427 [Farr M.L. 1986] : Commune de Cayenne. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5786 [Stephenson S.L. 1992] : Roche Koutou - Marouini river high basin.

Comatricha nigra (Persoon)Schroeter

-*Samuels G.J. & Boise J.R.* 2693 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5755 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin.

Comatricha typhoides (Bulliard)Rostafinski

-*Samuels G.J. & Searwar P.* 4320 [Farr M.L. 1986] : Lieu-Dit Citron - Paul Isnard area.

Stemonitis Roth

Stemonitis fusca Roth

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5635 [Stephenson S.L. 1992] : Ouman fou Langa Soula - Marouini river high basin.

Stemonitis pallida Wingate in Mcbride

-Samuels G.J. 3882 [Farr M.L. 1986] : Piste de Saint-Elie. *-Samuels G.J. & Searwar P.* 4094 [Farr M.L. 1986] : Camp minier Paul Isnard - Paul Isnard area.

Stemonitis splendens Rostafinski

-Samuels G.J. 3471 [Stephenson S.L. 1992] : Montagne La Fumée - Saül area. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 6046 [Stephenson S.L. 1992] : Monpé Soula - Marouini river high basin.

TRICHIACEAE

Arcyria Wiggers

Arcyria cinerea (Bulliard)Persoon

-Samuels G. & Feuillet C. 4466 [Farr M.L. 1986] : Montagne de Kaw. *-Samuels G. & Feuillet C.* 4557 [Farr M.L. 1986] : Montagne Cacao - Comté River basin. *-Samuels G.J.* 3502 [Stephenson S.L. 1992] : Montagne La Fumée - Saül area. *-Samuels G.J.* 3883 [Farr M.L. 1986] : Piste de Saint-Elie. *-Samuels G.J.* 3976 [Farr M.L. 1986] : same loc. *-Samuels G.J. & Boise J.R.* 2517 [Farr M.L. 1987] : Commune de Saül - Saül area. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 5636 [Stephenson S.L. 1992] : Ouman fou Langa Soula - Marouini River High basin. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 5755 [Stephenson S.L. 1992] : same loc. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 5945 [Stephenson S.L. 1992] : same loc. *-Samuels G.J. & Searwar P.* 4093 [Farr M.L. 1986] : Camp minier Paul Isnard - Paul Isnard area. *-Samuels G.J. & Searwar P.* 4161 [Farr M.L. 1990] : same loc.

Arcyria denudata (Linné)Wettstein

-Courtecuisse R. RC/GF88.426 [Meyer M. 1991] : Station de l'Arataye ; Arataye River - Approuague basin. *-Rossman A.Y., Feuillet C. & Skog L.E.* 3060 [Farr M.L. 1987] : Crique Limonade - Saül area. *-Samuels G. & Feuillet C.* 4468 [Farr M.L. 1986] : Montagne de Kaw. *-Samuels G.J.* 3884 [Farr M.L. 1986] : Piste de Saint-Elie. *-Samuels G.J.* 4040 [Samuels G.J. 1990] : same loc. *-Samuels G.J. & Searwar P.* 4343 [Farr M.L. 1986] : Lieu-Dit Citron - Paul Isnard area. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 5847 [Stephenson S.L. 1992] : Roche Koutou - Marouini River High basin. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 6044 [Stephenson S.L. 1992] : Monpé Soula - same area.

Arcyria insignis Kalchbrenner & Cooke

-Samuels G.J. & Boise J.R. 2806 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area.

Hemitrichia Rostafinski

Hemitrichia calyculata (Spegazzini)M.L. Farr

-Courtecuisse R. RC/GF88.020 [Meyer M. 1991] : Camp des Nouragues ; Arataye River - Approuague basin. *-Courtecuisse R.* RC/GF88.613 [Meyer M. 1991] : Saut Pararé ; Arataye River - same area. *-Samuels G.J.* 3546 [Farr M.L. 1990] : Bourg de Saül - Saül area. *-Samuels G.J. & Searwar P.* 4162 [Farr M.L. 1990] : Camp minier Paul Isnard - Paul Isnard area. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 6045 [Stephenson S.L. 1992] : Monpé Soula - Marouini river high basin.

Hemitrichia serpula (Scopoli)Rostafinski

-Samuels G. & Feuillet C. 4467 [Farr M.L. 1986] : Montagne de Kaw. *-Samuels G.J. & Searwar P.* 4272 [Farr M.L. 1986] : Massif Lucifer - Paul Isnard area.

Trichia Haller

Trichia favoginea (Batsch)Persoon

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 6094 [Stephenson S.L. 1992] : Monpé Soula - Marouini river high basin.

B - DEUTEROMYCOTA

Acrodictys M.B.Ellis

Acrodictys bambusicola M.B.Ellis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2823 [Samuels G.J.] : Macouria - Piste Saut Leodate.

Acrostroma Seifert

Acrostroma annellosynnema Seifert

-see *Batistia annulipes* (teleomorph)

Arthridium Kunze

Arthridium arundinarius

-*Rossman A.Y. & Feuillet C.* 3107 [Rossman A.Y.] : Rémiré - 15 km from Cayenne - Trail to Vidal old farm.

Chaetopsina Rambelli

Chaetopsina polyblastiae G.J.Samuels

-*Rossman A.Y. & Feuillet C.* 3231 [Samuels G.J., Seifert K.A.] : Montagne Tortue - Route de Belizon.

Chaetospermum Saccardo

Chaetospermum elasticae Koorders

-*Rossman A.Y. & Feuillet C.* [Nag Raj T.D.] : Cayenne - Rémiré.

Cylindrocarpon

Cylindrocarpon septosporum Samuels & Brayford

-see *Nectria septospora* (teleomorph)

Cytosphaera Diedicke

Cytosphaera mangiferae Diedicke

-*Rossman A.Y.* 4064 [Boise J.R. 1986] : Piste Balaté - 12 km from Saint-Laurent-du-Maroni.

Fusarium Link

Fusarium setosum Samuels & Nirenberg

-see *Nectria setofusariae* (teleomorph)

Gibellula Cavara

Gibellula pulchra (Saccardo)Cavara

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2806 [Seifert K.A.] : Macouria - Road from Tonate to Montsinery.

Gliocladium Corda

Gliocladium polyporicola (Hennings)Seifert

-*Rossman A.Y. & Feuillet C.* 3225 [Seifert K.A.] : Montagne Tortue - Route de Belizon. -*Rossman A.Y. & Feuillet C.* 3231 [Samuels G.J., Seifert K.A.] : same loc.

Gliocladium sp.

-*Rossman A.Y. & Feuillet C.* 3206 [Seifert K.A.] : Rémiré - 15 km from Cayenne - Trail to Vidal old farm.

Harpographium Saccardo

Harpographium sp.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3085 [Seifert K.A.] : Saint-Laurent-du-Maroni - Piste de Paul Isnard.

Hymenostilbe Petch

Hymenostilbe sp.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 4016 [Seifert K.A.] : Saint-Laurent du Maroni - Road to Javouhey.

Hymenostilbe sp.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3026 [Seifert K.A.] : Trail to Mont Galbao, between Crique Cambrouze and Crique Eau Noire - Saül area.

Lasiodiplodia Ellis & Everhart

Lasiodiplodia theobromae (Patouillard)Griffith & Maublanc

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3052 [Samuels G.J.] : Trail to Crique Limonade - Saül area.

Melanographium Saccardo

Melanographium cookei M.B.Ellis

-*Rossman A.Y. & Feuillet C.* 3121 [Seifert K.A.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm.

Myrothecium Tode

Myrothecium sp.

-see *Nectria pityrodes* (teleomorph)

Nodulisporium Preuss

Nodulisporium ? acervatum (Massee)Deighton

-*Rossman A.Y. & Feuillet C.* 3192 [Seifert K.A.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm.

Nodulisporium gregarium (Berkeley & Curtis)J.Meyer

-*Rossman A.Y. & Feuillet C.* 3191 [Seifert K.A.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm.

Penicillifer Van Emden

Penicillifer bipapillatus Samuels

-see *Nectria alata* (teleomorph)

Penicillifer microsporus Samuels

-see *Nectria penicilliferi* (teleomorph)

Penicillium Link

Penicillium sp.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2975 [Seifert K.A.] : Beginning of Mont Galbao Trail - Saül area.

Pestalotia de Notaris

Pestalotia guepinii Desmazières

-*Kennelty R.* [Watson A.J.] : ?

Sarcopodium Ehrenberg

Sarcopodium sp.

-see *Nectria flavolanata* (teleomorph)

Sesquicillium W. Gams

Sesquicillium impariphiale Samuels

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Spegazzinia Saccardo

Spegazzinia deightonii (S.J.Hughes)Subramanian

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3075 [Seifert K.A.] : Saint-Laurent-du-Maroni - Piste de Paul Isnard.

Stilbella Lindau

Stilbella aciculosa (Ellis & Everhart)Seifert

-see *Nectria stilbellae* (teleomorph)

Stilbella aleuriata (Berkeley & Curtis)Seifert

-*Rossman A.Y., Feuillet C. & Skog L.E.* (without n°) : Crique Cochon & Plateau La Douane - Saül area.

Stilbella clavulata (Montagne)Seifert

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3078 : Saint-Laurent-du-Maroni - Piste de Paul Isnard. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3084 : same loc. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4078 [Seifert K.A.] : same loc. 20 km.

Stilbella fusca (Saccardo)Seifert

-see *Nectria jatrophae* (teleomorph)

Termitaria Thaxter

****Termitaria coronata*** Thaxter

-Blackwell & Ross, 1986:592

Tubercularia Tode

Tubercularia lateritia (Berkeley)Seifert

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3013 [Seifert K.A.] : Trail to Mont Galbao, between Crique Cambrouze and Crique Eau Noire - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3045 [Seifert K.A.] : Trail to Cambrouze - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4007 [Seifert K.A.] : Saint-Laurent-du-Maroni - Mana. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4077 [Seifert K.A.] : Saint-Laurent-du-Maroni - Piste de Paul Isnard. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4085 [Seifert K.A.] : same loc.

Uvaricospora Goos & Pirozynski

Uvaricospora lignicola Goos & Pirozynski

-*Rossman A.Y. & Feuillet C.* 3311 [Seifert K.A.] : Piste de Saut Leodate.

Xylocoremium

Xylocoremium sp.

-*Rossman A.Y., Feuillet C. & Skog L.E. 3046* [Seifert K.A.] : Trail to Cambrouze - Saül area.

C - ASCOMYCOTINA

C1 - ***Loculoascomycetideae*** (see also Incertae Sedis).

BOTRYOSPHAERIACEAE

Auerswaldia Saccardo

Auerswaldia examinans (Montagne & Berkeley) Saccardo

-*Samuels G.J.* 3529 [Huhndorf S.M. 1994] : Monts la Fumée - Saül area.

Botryosphaeria Cesati & De Notaris

Botryosphaeria corticis (Berkeley & Curtis)v.Arx & Müller

-*Samuels G.J. & Boise J.R.* 2639 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area.

Botryosphaeria disrupta (Berkeley & Curtis)v.Arx & Müller

-*Huhndorf S.M.* 1046 [Barr M.E. 1994] : Eau Claire -Saül area.

Botryosphaeria quercuum (Schweinitz)Saccardo

-Rossman A.Y., Feuillet C. & Skog L.E. 2961 [Boise J.R. 1986] : Saut Maïs, 17 km E of Saül - Saül area. *-Rossman A.Y.* 3028 [Boise J.R. 1986] : Trail to Mont Galbao, between Crique Cambrouze and Crique Eau Noire - Saül area. *-Samuels G.J. & Boise J.R.* 2486 [Huhndorf S.M. 1994] : Track from village to water source - Saül area. *-Samuels G.J. & Boise J.R.* 2648 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area.

COCCOIDEACEAE

Coccoidella Von Höhnel

Coccoidella euglypta (Montagne)Müller & Sanwal

-Leprieur 241 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Dothidea*) ; Dennis 1970:219

DACAMPIACEAE

Immotthia Barr

Immotthia hypoxylon (Ellis & Everhart)Barr

-Samuels G.J. 3462 [Huhndorf S.M. 1994] : Mont La Fumée - Saül area. *-Huhndorf S.M.* 755 [Huhndorf S.M. 1993] : S of Eau Claire along Route de Belizon - Saül area.

DIDYMOSPHAERIACEAE

Xylobotryum Patouillard

Xylobotryum andinum Patouillard

-Samuels G.J., Granville J.-J. de, Allorge L. & al. 6179 [Huhndorf S.M. 1994] : Monpe Soula - Upper Marouini River area. *-Huhndorf S.M.* 932 [Huhndorf S.M. 1994] : Grand Boeuf Mort trail - Saül area.

HERPOTRICHIELLACEAE

Capronia Saccardo

Capronia parasitica (Ellis & Everhart)Müller & al.

-Samuels G.J. 3769 [Huhndorf S.M. 1994] : Vicinity of the village - Saül area.

Berlesiella Saccardo

Berlesiella fungicola Samuels & Müller

-Huhndorf S.M. 1035a [Huhndorf S.M. 1994] : S of Eau Claire - Saül area. *-Huhndorf S.M.* 861a [Huhndorf S.M. 1994] : Eau Claire - Saül area. *-Huhndorf S.M.* 875a [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area.

HYSTERIACEAE

Glonium Mühlenberg : Fries

Glonium abbreviatum (Schweinitz)Lohman

-Samuels G.J. 3433 [Huhndorf S.M. 1994] : Monts La Fumée - Saül area. *-Samuels G.J.* 3919 [Huhndorf S.M. 1994] : between Sinnamary and St.Elie 'ECEREX', ORSTOM research area - Piste de Saint-Elie. *-Huhndorf S.M.* 684 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. *-Huhndorf S.M.* 756 [Huhndorf S.M. 1994] : Eau Claire, S on Route of Belizon - Saül area.

Hysterographium Corda emend. deNotaris

Hysterographium mori (Schweinitz)Rehm

-*Samuels G.J. & Boise J.R.* 2682 [Huhndorf S.M. 1994] : Ca. 10 km SW of Saül toward Mont Galbao - Saül area.

LOPHIOSTOMATACEAE

Herpotrichia Fuckel

Herpotrichia milletiae Sivanesan

-*Samuels G.J. & Searwar P.* 4358 [Huhndorf S.M. 1994] : ca. 150km S of St.Laurent du Maroni, Citron - Paul Isnard area.

Lophiostoma Cesati & de Notaris

Lophiostoma caulium (Fries)Cesati & de Notaris

-*Huhndorf S.M.* 788 [Huhndorf S.M. 1994] : N of Eau Claire - Saul area.

Massarina Saccardo

Massarina corticola (Fuckel)Holm

-*Samuels G.J. & Boise J.R.* 2930 [Huhndorf S.M. 1994] : ca. 15km SW of Saül toward Mont Galbao - Saül area.

MELANOMMATACEAE

Byssosphaeria M.C. Cooke

Byssosphaeria erythrinae (Huguenin)Barr

-*Huhndorf S.M.* 785 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area.

Byssosphaeria jamaicana (Sivanesan)Barr

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2953 [Boise J.R. 1987] : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2965 [Boise J.R. 1987] : same loc. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3003 [Boise J.R. 1987] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2717 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area. -*Samuels G.J. & Searward P.* 4329 [Huhndorf S.M. 1994] : Citron -Paul Isnard area. -*Samuels G.J.* 4511 [Samuels G.J. 1986] : Centre ORSTOM - Cayenne. -*Huhndorf S.M.* 663 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. -*Huhndorf S.M.* 786 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 945 [Huhndorf S.M. 1994] : Grand Boeuf Mort trail -Saül area.

Byssosphaeria rhodomphala (Berkeley)M.C. Cooke

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3016 [Boise J.R. 1987] : Mont Galbao - Saül area. -*Samuels G.J. & Boise J.R.* 3197 [Huhndorf S.M. 1994] : ca. 17.5km SW toward Mont Galbao - Saül area. -*Samuels G.J.* 3527 [Huhndorf S.M. 1994] : Monts La Fumée - Saül area. -*Samuels G.J. & Boise J.R.* 2519 [Huhndorf S.M. 1994] : ca. 10km toward Mont Galbao - Saül area.

Byssosphaeria schiedermayriana (Fuckel)Barr

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2882 [Boise J.R. 1987] : Crique Cochon - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3020 [Boise J.R. 1987] : Mont Galbao - Saül area. -*Rossman A.Y. & Feuillet C.* 3248 : Montagne Tortue - Route de Belizon. -*Samuels G.J. & Boise J.R.* 2726 [Huhndorf S.M. 1994] : ca. 10km toward Mont Galbao - Saül area. -*Samuels G.J. & Boise J.R.* 3054 [Huhndorf S.M. 1994] : ca. 15km toward Mont Galbao - Saül area. -*Samuels G.J.* 3776 [Huhndorf S.M. 1994] : Vicinity of the village - Saül area. -*Huhndorf S.M.* 1037 [Huhndorf S.M. 1994] : Eau Claire, S along Route de Belizon - Saül area. -*Huhndorf S.M.* 710 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 985 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 842 [Huhndorf S.M. 1994] : S of Eau Claire - Saül area. -*Huhndorf S.M.* 843 [Huhndorf S.M. 1994] : same loc.

Byssosphaeria villosa (Samuels & Müller)Boise

-*Samuels G.J.* 3534 [Huhndorf S.M. 1994] : Monts La Fumée - Saül area.

Mycopepon Boise

Mycopepon smithii (Ellis & Everhart)Boise

-*Samuels G.J. & Boise J.R.* 2991 [Boise J.R. 1986] : Mont Galbao - Saül area (HOLOTYPE FH, sub nom. *M.guianensis*). -*Samuels G.J. & Boise J.R.* 3042 [Huhndorf S.M. 1994] : ca. 15km SW toward Mont Galbao - Saül area. -*Samuels G.J. & Boise J.R.* 3376 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J. & Boise J.R.* 3384 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6035 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5673 [Samuels G.J. 1987] : same loc. -*Samuels G.J.* 3623 [Huhndorf S.M. 1994] : Circuit Grande Fosse - Saül area. -*Huhndorf S.M.* 690 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. -*Huhndorf S.M.* 700 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 704 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 1045 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 841 [Huhndorf S.M. 1994] : S of Eau Claire - Saül area.

Ostropella (Saccardo)von Höhnel

Ostropella albocincta (Berkeley & Curtis)von Höhnel

-*Samuels G.J. & Boise J.R.* 2669 [Huhndorf S.M. 1992] : ca. 10km SW toward Mont Galbao -Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 6144 [Huhndorf S.M. 1992] : Monpe Soula - Upper Marouini River area. -*Huhndorf S.M.* 723 [Huhndorf S.M. 1994] : NE of Eau Claire -Saül area.

Xenolophium H.Sydow

Xenolophium applanatum (Petch)Huhndorf

-*Samuels G.J. & Boise J.R.* 2574 [Huhndorf S.M. 1992] : ca. 10km SW toward Mont Galbao - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 6187 [Huhndorf S.M. 1992] : 2 km S of Monpe Soula - Upper Marouini River area. -*Huhndorf S.M.* 921 [Huhndorf S.M. 1994] : Eau claire - Saül area. -*Huhndorf S.M.* 925 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 990 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 991 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 994 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 998 [Huhndorf S.M. 1994] : same loc.

Xenolophium guianense Huhndorf

-*Samuels G.J. & Searwar P.* 4184 [Huhndorf S.M. 1992] : ca. 150km S of Saint-Laurent du Maroni, Citron, Mont Lucifer -Paul Isnard area (HOLOTYPE FH).

Xenolophium pachythele (Berkeley & Broome)Huhndorf

-*Samuels G.J.* 3636 [Huhndorf S.M. 1994] : Circuit Grand Fosse - Saül area. -*Huhndorf S.M.* 726 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 992 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 993 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 996 [Huhndorf S.M. 1994] : same loc.

Xenolophium samuelsii Huhndorf

-Samuels G.J. & Boise J.R. 2516 [Huhndorf S.M. 1992] : ca. 10km SW toward Mont Galbao - Saül area (HOLOTYPE FH).

PARODIOPSIDACEAE

Dysrynchis Clements

Dysrynchis oligotricha (Hennings)Theissen

-Leprieur 1149 ; cited in Montagne 1854 (sub nom. *Meliola*) ; Farr 1966:234

PATELLARIACEAE

Rhytidhysterion Spegazzini

Rhytidhysterion rufulum (Sprengel : Fries)Spegazzini

-Rossman A.Y., Feuillet C. & Skog L.E. 3066 [Boise J.R. 1987] : Route de Paul Isnard - Paul Isnard area. *-Rossman A.Y. & Feuillet C.* 3109 : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. *-Rossman A.Y. & Feuillet C.* 3110 : same loc. *-Rossman A.Y., Feuillet C. & Skog L.E.* 4000 [Boise J.R. 1986] : Piste de Paul Isnard - Saint-Laurent-du-Maroni. *-Samuels G.J.* 3479 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. *-Samuels G.J. & Boise J.R.* 2728 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. *-Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5983 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 5873 [Samuels G.J. 1990] : Roche Koutou - same area.

PHAEOSPHAERIACEAE

Ophiosphaerella Spegazzini

Ophiosphaerella graminicola Spegazzini

-Samuels G.J. & Boise J.R. 2998B [Huhndorf S.M. 1994] : ca. 15km SW toward Mont Galbao - Saül area. *-Samuels G.J. & Boise J.R.* 3074 [Huhndorf S.M. 1994] : same loc.

Phaeosphaeria Miyake

Phaeosphaeria minima Shoemaker & Babcock

-Samuels G.J. & Boise J.R. 2998 [Huhndorf S.M. 1994]: ca. 15km SW toward Mont Galbao - Saül area.

PLATYSTOMACEAE

Astrosphaeriella H.Sydow & Sydow

Astrosphaeriella minoensis (Hara)D.Hawksworth

-Samuels G.J. & Boise J.R. 3262 [Huhndorf S.M. 1994] : toward Mont Galbao - Saül area.

Astrosphaeriella stellata (Patouillard)Saccardo

-Samuels G.J. & Boise J.R. 3264 [Huhndorf S.M. 1994] : toward Mont Galbao - Saül area.

Astrosphaeriella tornata (Berkeley & Curtis)D.Hawksworth & Boise

-Samuels G.J. & Boise J.R. 2714 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area. *-Huhndorf S.M.* 661 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. *-Huhndorf S.M.* 722 [Huhndorf S.M. 1994] : same loc. *-Huhndorf S.M.* 719 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. *-Huhndorf S.M.* 999

[Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 720 [Huhndorf S.M. 1994] : same loc.

Astrosphaeriella trochus (Penzig & Saccardo)D.Hawksworth

-*Samuels G.J.* 3783 [Huhndorf S.M. 1994] : Vicinity of the village - Saül area. -*Huhndorf S.M.* 804 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. -*Huhndorf S.M.* 812 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 813 [Huhndorf S.M. 1994] : same loc.

Astrosphaeriella vesuvius (Berkeley & Broome)D.Hawksworth

-*Samuels G.J. & Boise J.R.* 2702 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area.

Javaria Boise

Javaria shimekii (Ellis & Everhart)Barr

-*Samuels G.J. & Boise J.R.* 2684 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area. -*Samuels G.J.* 4055 [Huhndorf S.M. 1994] : between Sinnamary and St.Elie, 'ECEREX' ORSTOM research area -Piste de Saint-Elie area. -*Huhndorf S.M.* 807 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. -*Huhndorf S.M.* 814 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 896 [Huhndorf S.M. 1994] : Eau Claire - Saül area. -*Huhndorf S.M.* 988 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 1010 [Huhndorf S.M. 1994] : same loc.

Trematosphaeria Fuckel

Trematosphaeria confusa (Garov.)Boise & D.Hawksworth

-*Huhndorf S.M.* 758 [Huhndorf S.M. 1994] : S of Eau Claire - Saül area. -*Huhndorf S.M.* 1058 [Huhndorf S.M. 1994] : along N1 - Kourou area.

Trematosphaeria perrumpens Samuels & Müller

-*Samuels G.J.* 3505 [Huhndorf S.M. 1994]: Monts La Fumée - Saül area. -*Huhndorf S.M.* 703 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 875 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 745 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 828 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. -*Huhndorf S.M.* 861 [Huhndorf S.M. 1994] : Eau Claire - Saül area. -*Huhndorf S.M.* 1035 [Huhndorf S.M. 1994] : S of Eau Claire - Saül area.

TUBEUFIACEAE

Melioliphila Spegazzini

Melioliphila volutella (Berkeley & Broome)Rossman

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6043 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Tubeufia Penzig & Saccardo

Tubeufia aurantiella (Penzig & Saccardo)Rossman

-*Huhndorf S.M.* 975 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area.

Tubeufia clintonii (Peck)Barr

-*Samuels G.J. & Boise J.R.* 2613 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area. -*Samuels G.J. & Searwar P.* 4167 [Huhndorf S.M. 1994] : Citron, Mont Lucifer - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4364 [Huhndorf S.M. 1994] : Citron - same area. -*Samuels G.J. & Feuillet C.* 4476 [Huhndorf S.M. 1994] : Route de l'est, ca. km 50 - Montagne de Kaw area. -*Samuels G.J. &*

Boise J.R. 2591 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area.

Tubeufia cylindrothecia (Seaver)Von Höhnel

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2842 : Near Camp Caïman, Summit Plateau - Montagne de Kaw. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5799 [Huhndorf S.M. 1994]: ca. 3 hr walk W of river toward Roche Koutou, 1 km E of Roche Koutou - Upper Marouini River area. -*Samuels G.J.* 3516 [Huhndorf S.M. 1994] : Monts La Fumée - Saül area. -*Samuels G.J.* 3530 [Huhndorf S.M. 1994] : Circuit Grande Fosse - Saül area. -*Samuels G.J.* 3648 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J.* 3671 [Huhndorf S.M. 1994] : Cambrouze - Saül area. -*Samuels G.J.* 3957 [Huhndorf S.M. 1994] : between Sinnamary and St.Elie, 'ECEREX' ORSTOM research area -Piste de Saint-Elie area. -*Samuels G.J. & Searwar P.* 4168 [Huhndorf S.M. 1994] : Citron, Mont Lucifer - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4219 [Huhndorf S.M. 1994] : Citron, Mont Decou Decou - same area. -*Huhndorf S.M.* 736 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 948 [Huhndorf S.M. 1994] : Grand Boeuf Mort trail - Saül area.

Tubeufia helicoma (Phillips & Plowright)Pirozynski

-*Rossman A.Y., Feuillet C. & Skog L.E.* 4093 [Boise J.R. 1986] : Sinnamary - Track to the sea. -*Samuels G.J. & Feuillet C.* 4474 [Huhndorf S.M. 1994] : Route de l'est, ca. km 50 -Montagne de Kaw area. -*Samuels G.J. & Searwar P.* 4370 [Huhndorf S.M. 1994]: Citron - Paul Isnard area.

Tubeufia paludosa (Crouan & Crouan)Rossman

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2959 [Rossman A.Y.] : Saut Maïs - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5862 [Huhndorf S.M. 1994] : vicinity of Roche Koutou - Upper Marouini river area. -*Samuels G.J.* 3750 [Huhndorf S.M. 1994] : Vicinity of the village - Saül area. -*Samuels G.J.* 3958 [Huhndorf S.M. 1994] : between Sinnamary and St.Elie 'ECEREX' ORSTOM research area - Piste de Saint-Elie area. -*Huhndorf S.M.* 692 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area.

Tubeufia pezizula (Berkeley & Curtis)Barr

-*Samuels G.J.* 3616 [Huhndorf S.M. 1994] : Mont Boeuf Mort - Saül area. -*Samuels G.J.* 3907 [Huhndorf S.M. 1994] : between Sinnamary and St.Elie 'ECEREX' ORSTOM research area - Piste de Saint-Elie area. -*Samuels G.J. & Boise J.R.* 3254 [Huhndorf S.M. 1994] : toward Mont Galbao - Saül area.

Tubeufia roraimensis (Samuels & Mueller)Boise

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2833 [Boise J.R. 1987] : Montagne de Kaw. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2875 [Boise J.R. 1987] : Crique Cochon - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2971 [Boise J.R. 1987] : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2973 [Boise J.R. 1987] : same loc. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3079 [Boise J.R. 1987] : Route de Paul Isnard - Paul Isnard area. -*Rossman A.Y. & Feuillet C.* 3296 [Rossman A.Y.] : Piste de Saut Leodate. -*Samuels G. & Feuillet C.* 4491 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J.* 3959 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 3299 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5828 [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin. -*Samuels G.J.* 3598 [Huhndorf S.M. 1994] : Mont Boeuf Mort - Saül area. -*Samuels G.J.* 3760 [Huhndorf S.M. 1994] : Vicinity of the village

- Saül area. -*Huhndorf S.M.* 901 [Huhndorf S.M. 1994] : Eau Claire - Saül area. -*Huhndorf S.M.* 905 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 907 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 727 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 1020 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 750 [Huhndorf S.M. 1994] : S of Eau Claire - Saül area. -*Huhndorf S.M.* 848 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 781 [Huhndorf S.M. 1994] : N of Eau Claire - Saül area. -*Huhndorf S.M.* 820 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 822 [Huhndorf S.M. 1994] : same loc. -*Huhndorf S.M.* 965 [Huhndorf S.M. 1994] : Lyon Biche trail, S of Eau Claire - Saül area. -*Huhndorf S.M.* 1053 [Huhndorf S.M. 1994] : Montagne de Kaw.

Tubeufia scopula (Cooke & Peck)Barr

-*Samuels G.J. & Boise J.R.* 2689 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area.

Tubeufia sp.

-*Rossman A.Y. & Feuillet C.* 3265 : Route de Belizon - Montagne Tortue. -*Rossman A.Y.* 3325 [Rossman A.Y.] : Rémiré near Cayenne - Path to Vidal old farm.

C2 - *Pyrenomycetideae*

AMPHISPHAERIACEAE

Amphisphaeria Cesati & de Notaris

Amphisphaeria striatispora Candoussau & Katumoto

-*Samuels G.J. & Boise J.R.* 2998a [Huhndorf S.M. 1994] : toward Mont Galbao - Saül area. -*Huhndorf S.M.* 762 [Huhndorf S.M. 1994] : S of Eau Claire along route de Belizon - Saül area.

Iodosphaeria Samuels, Müller & O. Petrini

Iodosphaeria phyllophila (Mouton)Samuels, Müller & O. Petrini

-*Samuels G.J.* 3704 [Samuels G.J. 1986] : Layon Galbao - Saül area.

Seynesia Saccardo

Seynesia erumpens (Berkeley & Curtis)Petrak

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6158 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5677 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5758 [Samuels G.J. 1990] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5820 [Samuels G.J. 1990] : Roche Koutou - same area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5913 [Samuels G.J. 1987] : same loc. -*Samuels G.J. & Boise J.R.* 2869 [Huhndorf S.M. 1994] : ca. 15km SW toward Mont Galbao - Saül area. -*Samuels G.J. & Boise J.R.* 2896 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J. & Boise J.R.* 3018 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J. & Boise J.R.* 3027 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J. & Boise J.R.* 3050 [Huhndorf S.M. 1994] : same loc. -*Samuels G.J. & Boise J.R.* 3351 [Huhndorf S.M. 1994] : ca. 17.5km SW same loc. -*Samuels G.J. & Searwar P.* 4229 [Huhndorf S.M. 1994] : Citron - Paul Isnard area.

BATISTIACEAE

Batistia Ciferri

Batistia annulipes (Montagne)Ciferri

-*Samuels G.J.* 3840 [Samuels G.J. 1988] : Piste de Saint-Elie. -*Samuels G.J.* 6059 [Samuels G.J. 1987] : Monpé Soula - Marouini River high basin.

BOLINIACEAE

Apiocamarops Samuels & Rogers

Apiocamarops alba Samuels & Rogers

-*Samuels G. & Feuillet C.* 4454 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3696 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3816 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 3012 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3301 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4114 [Samuels G.J. 1987] : Camp minier Paul Isnard - Paul Isnard area. -*Rossman A.Y & Feuillet C.* 3156 [Samuels G.J.] : 70 km E of Cayenne - Montagne Cacao, Piste Coralie. -*Rossman A.Y.* 3377 [Samuels G.J.] : Montagne de Kaw. -*Rossman A.Y. & Feuillet C.* 3151 [Samuels G.J.] : 40 km S of Cayenne - Montagne Cacao, Piste Coralie. -*Rossman A.Y. & Feuillet C.* 3280 [Samuels G.J.] : Montagne Tortue - 15 km from road, track to Route de Belizon.

Camarops P. Karsten

Camarops biporosa Rogers & Samuels

-*Samuels G.J.* 3407 [Samuels G.J. 1986] : Bourg de Saül - Saül area (HOLOTYPE NY).

****Camarops scleroderma*** (Montagne)Nannfeldt

-Leprieur 431 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Hypoxylon*) ; Samuels & Rogers 1987:46

Camarops ustulinoides (P. Hennings)Nannfeldt

-*Samuels G. & Feuillet C.* 4483 [Samuels G.J. 1986] : Montagne de Kaw. -*Sa-muels G.J.* 3714 [Rogers J.D. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3917 [Rogers J.D. 1987] : Piste de Saint-Elie. -*Samuels G.J. & Searwar P.* 4169 [Rogers J.D. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5959 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5901 [Samuels G.J. 1987] : Roche Koutou - same area.

CALOSPHAERIACEAE

Calosphaeria L.R. & C. Tulasne

****Calosphaeria micromeria*** (Montagne)Berkeley

-Leprieur 1174 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Diatrype*).

CLAVICIPITACEAE

Cordyceps (Fries) Link

****Cordyceps larvata*** Montagne

-Leprieur 402 ; cited in Montagne 1854 (doubtful)

Hypocrella Saccardo

Hypocrella gaertneriana Moeller

-*Samuels G.J. & Boise J.R.* 3255 [Samuels G.J. & Boise J.R. 1990] : Bourg de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4305 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area.

DIATRYPACEAE

Diatrype Fries

****Diatrype phaselina*** (Montagne)Rappaz

-Leprieur 1219 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Sphaeria*) ; Dennis 1970:272 ; Rappaz 1987:442

****Diatrype urticaria*** (Montagne)Rappaz

-Leprieur 573 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Sphaeria*) ; Rappaz 1987:440

Diatrypella (Cesati & De Notaris) De Notaris

Diatrypella quercina (Persoon : Fries)Cooke

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2869 [Boise J.R. 1987] : Commune de Saül - Saül area.

GNOMONIACEAE

Diaporthe Nitschke

Diaporthe arctii (Lasch)Nitschke

-*Samuels G.J. & Boise J.R.* 2809 [Huhndorf S.M. 1994] : ca. 15km SW toward Mont Galbao - Saül area.

HYPOCREACEAE

Arachnocrea Moravec

Arachnocrea scabrida Doi

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5858 [Rogerson C.T. 1987] : Roche Koutou - Marouini River high basin.

Calonectria De Notaris

Calonectria colhounii Peerally

-*Huhndorf S.M.* 889 [Samuels G.J. 1994] : Eau Claire - Saül area.

Calonectria kyotensis Terashita

-*Samuels G.J.* 3551 [Samuels G.J. 1986] : Bourg de Saül - Saül area.

Endocreas Samuels & Rogerson

Endocreas lasiacidis Samuels & Rogerson

-*Samuels G.J.* 3785 [Samuels G.J. 1988] : Bourg de Saül - Saül area (HOLOTYPE NY). -*Samuels G.J. & Searwar P.* 4210 [Samuels G.J. 1989] : Massif du Décou-Décou - Paul Isnard area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5866 [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin.

Gibberella Saccardo

Gibberella fujikuroi (Sawada)Wollenweber

-*Samuels G. & Feuillet C.* 4563a [Samuels G. 1990] : Montagne Cacao - Comté River basin. -*Samuels G.J.* 3772 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3791 [Samuels G.J. 1988] : same loc.

Hypocrea Fries

****Hypocrea brevipes*** (Montagne)Saccardo

-Leprieur 1073 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Cordyceps*) ; Dennis 1970:311

Hypocrea flavovirens Berkeley

-*Huhndorf S.M.* 888 [Samuels G.J. 1994] : Eau Claire - Saül area.

Hypocrea fusca Montagne

-*Samuels G.J. & Searwar P.* 4358 [Samuels G.J. & Searwar P. 1990] : Lieu-Dit Citron - Paul Isnard area.

Hypocrea gelatinosa (Tode : Fries)Fries

-*Samuels G.J.* 3720 [Samuels G.J. 1986] : Layon Galbao - Saül area.

Hypocrea impressa Montagne

-*Rossmann A.Y. & Feuillet C.* 3198 [Samuels G.J.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm.

Hypocrea lutea (Tode)Petch

-*Courtecuisse R.* RC/GF88.179 [Samuels G.J. 1991] : Saut Pararé ; Arataye River - Approuague basin.

Hypocrea nigricans (Imai)Doi

-*Samuels G.J. & Boise J.R.* 3368 [Samuels G.J. & Boise J.R. 1990] : Bourg de Saül - Saül area.

Hypocrea pallida Ellis & Everhart

-*Samuels G.J. & Boise J.R.* 2587 [Rogerson C.T. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2803 [Samuels G.J. & Boise J.R. 1990] : same loc.

Hypocrea patella (Cooke)Peck

-*Courtecuisse R.* RC/GF88.208 [Samuels G.J. 1991] : Saut Pararé ; Arataye River - Approuague basin.

Hypocrea schweinitzii (Fries)Saccardo

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2896 [Samuels G.J. 1987] : Crique Cochon - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3088 [Samuels G.J. 1987] : Route de Paul Isnard - Paul Isnard area. -*Rossman A.Y. & Feuillet C.* 3193 [Samuels G.J.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. -*Samuels G. & Feuillet C.* 4385 [Samuels G.J. 1986] : Montagne de Kaw.

Hypocrea tingomariensis Doi

-*Samuels G.J. & Boise J.R.* 2841 [Samuels G.J. 1986] : Bourg de Saül - Saül area.

Hypomyces (Fries) Tulasne

Hypomyces amaurodermatis Rogerson & Samuels

-*Samuels G.J. & Searwar P.* 4238 : Massif du Dékou-Dékou - Paul Isnard area. -*Samuels G.J. & Feuillet C.* 4493 [Samuels G.J. & Rogerson C.T.] : ca. 50km route de l'Est - Montagne de Kaw (HOLOTYPE NY). -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5969 [Samuels G.J. & Rogerson C.T.] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6000 [Samuels G.J. & Rogerson C.T.] : same loc.

Hypomyces australis (Montagne)Von Höhnel

-*Rossman A.Y.* 4049 [Samuels G.J. 1987] : Piste Balaté - 12 km from Saint-Laurent-du-Maroni.

Hypomyces semitranslucens G. Arnold

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6110 [Rogerson C.T. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Hypomyces subiculosus (Berkeley & Curtis)vonHöhnel

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3001 [Rogerson C.T. 1986] : Commune de Saül - Saül area.

Nectria (Fries)Fries

Nectria alata Samuels

-*Samuels G.J.* 3896b [Samuels G.J. 1988] : Piste de Saint-Elie.

Nectria aureofulva Cooke & Peck

-*Samuels G.J. & Boise J.R.* 2663 [Samuels G.J. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4263 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area.

Nectria balansiae Spegazzini

-*Samuels G.J. & Boise J.R.* 3257 [Samuels G.J. 1988] : Bourg de Saül - Saül area.

Nectria brasiliensis (P. Hennings)Von Höhnel

-*Samuels G. & Feuillet C.* 4382 [Samuels G.J. 1986] : Montagne de Kaw.

Nectria byssicola Berkeley & Broome

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2993 [Samuels G.J. 1987] : Montagne La Fumée - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3036 [Samuels G.J. 1987] : Layon Galbao - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3047b : Cambrouze - Saül area. -*Rossman A.Y. & Feuillet C.* 3144 : 40 km S of Cayenne - Montagne Cacao, Piste Coralie. -*Rossman A.Y. & Feuillet C.* 3314 : Piste de Saut Leodate. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4037 : Piste Balaté - Saint-Laurent-du-Maroni. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4090 : Piste Paul Isnard - same area. -*Samuels G. & Feuillet C.* 4386 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G. & Feuillet C.* 4518 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3450 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3481 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3510 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3515 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3537 [Samuels G.J. 1990] : same loc. -*Samuels G.J.* 3868 [Samuels G.J. 1986] : Piste de Saint-Elie. - *Samuels G.J.* 3890 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3921 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3937 [Samuels G.J. 1986] : same loc. -Samuels *G.J.* 3963 [Samuels G.J. 1986] : same loc. -*Sa-muels G.J. & Boise J.R.* 2657 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -Samuels *G.J. & Boise J.R.* 3236 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3316 [Samuels G.J. 1986] : same loc. -*Sa-muels G.J. & Boise J.R.* 3319 [Samuels G.J. 1986] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5980 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6085 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5182 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Al-lorge L. & al.* 5651 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5662 [Samuels G.J. 1987] : same loc.

Nectria calami (P. Hennings)Rossman

-*Samuels G.J. & Boise J.R.* 3291 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6015 [Samuels G.J. 1987] : Ouman fou Langa Soula. - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6192 [Samuels G.J. 1987] : same loc.

Nectria chaetopsinae Samuels

-*Samuels G. & Feuillet C.* 4404 [Samuels G. & Feuillet C. 1990] : Montagne de Kaw. -*Samuels G. & Feuillet C.* 4563 [Samuels G.J. 1986] : Montagne Cacao - Comté River basin. -*Samuels G.J.* 3780 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3789 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4017 [Samuels

G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 4021 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4076 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4086 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3185 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4283 [Samuels G.J. & Searwar P. 1990] : Massif Lucifer - Paul Isnard area.

Nectria chaetopsinae-pennicillatae Samuels

-*Samuels G.J.* 3765 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3853 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2866 [Samuels G.J. 1986] : Bourg de Saül - Saül area.

Nectria cinnabarina (Tode : Fries)Fries

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6076 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Nectria cinnamomea Brayford & Samuels

-*Samuels G.J.* 3619 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area (HOLOTYPE NY). -*Samuels G.J.* 3888 [Samuels G.J. 1988] : Piste de Saint-Elie. -*Samuels G.J.* 3896 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Boise J.R.* 2533 [Samuels G.J. 1988] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2548 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Boise J.R.* 3553 [Sa-muels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4264 [Sa-muels G.J. 1986] : Massif Lucifer - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6077 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6086 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6155 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5710 [Samuels G.J. 1987] : same loc.

Nectria coronata Penzig & Saccardo

-*Samuels G.J. & Searwar P.* 3085b [Samuels G.J. 1986] : Mont Galbao - Saül area.

Nectria discophora (Montagne)Montagne

-*Samuels G.J.* 4013 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Searwar P.* 4249 [Samuels G.J. & Searwar P. 1990] : Massif du Dékou-Dékou - Paul Isnard area.

Nectria flammea (L.R. & C.Tulasne)Dingley

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5772 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin.

Nectria flavolanata Berkeley & Broome

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2829 : Macouria - Tonate to Montsinery ; End of Saut Leodate Track. -*Rossman A.Y. & Feuillet C.* 3136 : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. -*Rossman A.Y. & Feuillet C.* 3283 : Route de Belizon - Track to Montagne Tortue. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5857 [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin.

Nectria flocculenta Von Höhnel

-*Samuels G.J.* 3611 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3965 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 3966 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4060 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4081 [Samuels G.J. 1986] : same loc. -*Samuels G.J., Granville J.J. de,* *Allorge L. & al.* 5754 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Huhndorf S.M.* 774 [Samuels G.J. 1994] : Eau Claire - Saül area.

Nectria foliicola Berkeley & Curtis

-*Samuels G.J.* 3651 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Huhndorf S.M.* 862 [Samuels G.J. 1994] : Eau Claire - Saül area.

Nectria gossypina Samuels & Rogerson

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5978 [Samuels G.J. & Rogerson 1990] : Ouman fou Langa Soula - Marouini River high basin.

Nectria gracilipes (L.R. & C.Tulasne)Wollenweber

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2970 [Samuels G.J. 1987] : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3010 [Samuels G.J. 1987] : Layon Galbao - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3084 : Saint-Laurent du Maroni - Piste de Paul Isnard. -*Rossman A.Y.* 3327 [Samuels G.J.] : Rémiré - Cayenne ; Path to Vidal old farm. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4091 : Sinnamary. -*Samuels G. & Feuillet C.* 4554 [Samuels G.J. 1986] : Monta-gne des Singes - Kourou River basin. -*Samuels G.J.* 3451 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J. & Boise J.R.* 3281 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3308 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3309 [Samuels G.J. & Boise J.R. 1990] : same loc.

Nectria grammicospora Ferdinansen & Winge

-*Samuels G. & Feuillet C.* 4411 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J.* 3641 [Samuels G.J. 1987] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3641 [Samuels G.J. 1988] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3700 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3895 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 3895 [Samuels G.J. 1988] : Station ECEREX - same loc. -*Samuels G.J.* 3925 [Samuels G.J. 1987] : same loc. -*Samuels G.J.* 3925 [Samuels G.J. 1988] : same loc. -*Samuels G.J.* 3972 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3972 [Samuels G.J. 1988] : same loc. -*Samuels G.J.* 4002 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4215 [Samuels G.J. 1988] : Piste Citron - Dékou-Dékou - Paul Isnard area. -*Samuels G.J.* 4411 [Samuels G.J. 1988] : Dégrad Lalanne - Montagne de Kaw. -*Samuels G.J. & Boise J.R.* 2649 [Samuels G.J. 1987] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2783 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2862 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2908 [Samuels G.J. 1986] : same loc. -Samuels *G.J. & Boise J.R.* 2915[Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3109 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3244 [Samuels G.J. 1987] : same loc. -*Samuels G.J. & Boise J.R.* 3285 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3109 [Samuels G.J. 1988] : Layon Galbao - Saül area. -Samuels *G.J. & Boise J.R.* 2908 [Samuels G.J. 1988] : Mont Galbao - Saül area. -*Samuels G.J. & Boise J.R.* 2783 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Boise J.R.* 3244 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Boise J.R.* 3285 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Searwar P.* 4215 [Samuels G.J. 1986] : Massif du Dékou-Dékou - Paul Isnard area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5931b [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin. -*Huhndorf S.M.* 705 [Samuels G.J. 1994] :

NE of Eau Claire - Saül area. -*Huhndorf S.M.* 1032 [Samuels G.J. 1994] : same loc. -*Huhndorf S.M.* 1025 [Samuels G.J. 1994] : S of Eau Claire - Saül area.

Nectria haematococca Berkeley & Broome

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3024 [Samuels G.J. 1987] : Layon Galbao - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3047 [Samuels G.J. 1987] : Commune de Saül - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3052 [Samuels G.J.] : Trail to Crique Limonade - Saül area. -*Rossman A.Y. & Feuillet C.* 3297 : Piste de Saut Leodate. -*Rossman A.Y. & Feuillet C.* 3315 : same loc. -*Samuels G. & Feuillet C.* 4516 [Samuels G.J. 1990] : Centre ORSTOM - Cayenne. -*Samuels G. & Feuillet C.* 4536 [Samuels G. & Feuillet C. 1990] : Montagne des Singes - Kourou River basin. -*Samuels G.J.* 3554 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3572 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3624 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3699 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3701 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3733 [Samuels G.J. 1990] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3752 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3872 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 4000 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 4033 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2549 [Samuels G.J. 1988] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2646a [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2654 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2727 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2824 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2848 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -Samuels *G.J. & Boise J.R.* 2873 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Boise J.R.* 2901 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2903 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2934 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 3014 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3017 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3114 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3125 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3148 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3161 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3166 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 3228 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3395 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Searwar P.* 3073 [Samuels G.J. 1986] : Mont Galbao - Saül area. -*Samuels G.J. & Searwar P.* 4177 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4190 [Samuels G.J. & Searwar P. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4252 [Samuels G.J. 1986] : Massif du Dékou-Dékou - same area. -*Samuels G.J. & Searwar P.* 4267 [Samuels G.J. 1986] : Massif Lucifer - same area. -*Samuels G.J. & Searwar P.* 4311 [Samuels G.J. 1986] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5989 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -Samuels *G.J., Granville J.-J. de, Allorge L. & al.* 6007 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6008 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J.*

de, Allorge L. & al. 5661 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5678 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5690 [Samuels G.J. 1990] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5707a [Samuels G.J. 1987] : same loc. -Samuels G.J., *Granville J.J. de, Allorge L. & al.* 5707b [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5872 [Samuels G.J. 1987] : Roche Koutou - same area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5931a [Samuels G.J. 1987] : same loc. -*Huhndorf S.M.* 666 [Samuels G.J. 1994] : N of Eau Claire - Saül area.

Nectria illudens Berkeley

-*Samuels G.J.* 3415 [Samuels G.J. 1988] : Bourg de Saül - Saül area. -*Samuels G.J.* 3750 [Samuels G.J. 1990] : same loc.

Nectria impariphialis Samuels

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5981 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin (HOLOTYPE NY).

Nectria jatrophae (Mueller)Wollenweber

-*Courtecuisse R.* RC/GF88.603 [Samuels G.J. 1991] : Saut Pararé ; Arataye River - Approuague basin. -*Rossman A.Y. & Feuillet C.* 3222 [Samuels G.J.] : Route de Belizon - Track to Montagne Tortue. -*Rossman A.Y. & Feuillet C.* 3230b : same loc. -*Samuels G. & Feuillet C.* 4378 [Samuels G. & Feuillet C. 1990] : Montagne de Kaw. -*Samuels G.J.* 3414 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3719 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3928 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2585 [Samuels G.J. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2812 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Searwar P.* 4214 [Samuels G.J. 1986] : Massif du Dékou-Dékou - Paul Isnard area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5802 [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5835 [Samuels G.J. 1987] : same loc.

Nectria joca Samuels

-*Huhndorf S.M.* 939 [Samuels G.J. 1994] : NE of Eau Claire - Saül area.

Nectria jungeri P. Hennings

-*Courtecuisse R.* RC/GF88.686 [Samuels G.J. 1991] : Saut Pararé ; Arataye River - Approuague basin. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2957 [Samuels G.J.] : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3000 [Samuels G.J. 1987] : Commune de Saül - Saül area. -*Rossman A.Y. & Feuillet C.* 3217 : Rémiré - 15 km from Cayenne ; Trail to Vidal old farm. -*Rossman A.Y. & Feuillet C.* 3223 : Route de Belizon - Track to Montagne Tortue. -*Samuels G. & Feuillet C.* 4395 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G. & Feuillet C.* 4503 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3405 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3457 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3511 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3889 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 3891 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3988 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2505 [Samuels G.J. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2531 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2542 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2928 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2978 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3113 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3265 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3365 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3391 [Samuels G.J. 1986] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6006 [Samuels G.J. 1989] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6064 [Samuels G.J. 1989] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6160 [Samuels G.J. 1990] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6166 [Samuels G.J. 1987] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5654 [Samuels G.J. 1989] : same loc. -*Huhndorf S.M.* 717 [Samuels G.J. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 827 [Samuels G.J. 1994] : N of Eau Claire - Saül area.

Nectria laetidiscoides Samuels & Brayford

-*Samuels G.J. & J.Boise* 2890 [Samuels G.J. & Brayford D. 1993] : ca 15 km toward Mont Galbao, SW of Saül - Saül area (HOLOTYPE NY). -*Samuels G.J. & J.Boise* 3396 [Samuels G.J. & Brayford D. 1993] : same loc.

Nectria lasiacidis Samuels

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5864 [Samuels G.J. 1988] : Roche Koutou - Marouini River high basin (HOLOTYPE NY).

Nectria lucida Von Höhnel

-*Samuels G. & Feuillet C.* 4519 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3621 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3987 [Samuels G.J. 1990] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2650 [Samuels G.J. 1988] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2847 [Samuels G.J. 1990] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2911 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2931 [Samuels G.J. 1988] : same loc. -*Samuels G.J. & Boise J.R.* 2956 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2965 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Searwar P.* 4163 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area.

Nectria lucifer Samuels

-*Samuels G.J.* 3542 [Samuels G.J. 1987] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3362 [Samuels G.J. 1987] : same loc. -*Samuels G.J.* 3542 [Samuels G.J. 1988] : Commune de Saül - Saül area. -*Samuels G.J.* 3726 [Samuels G.J. 1988] : same loc. -*Samuels G.J.* 3726 [Samuels G.J. 1987] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3898 [Samuels G.J. 1987] : Piste de Saint-Elie. -*Samuels G.J.* 3898 [Samuels G.J. 1988] : Station ECEREX - Piste de Saint-Elie. -*Samuels G.J.* 5891 [Samuels G.J. 1988] : Roche Koutou - Marouini river high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5891 [Samuels G.J. 1987] : same loc. -*Samuels G.J.* 6066 [Samuels G.J. 1988] : Monpé Soula - same area. -*Samuels G.J. & Boise J.R.* 3362 [Samuels G.J. 1988] : Mont Galbao - Saül area.

Nectria macrostoma Berkeley & Broome

-*Samuels G.J.* 3446 [Samuels G.J. 1990] : Montagne La Fumée - Saül area. - *Samuels G.J.* 3593 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. - *Samuels*

G.J. 3723 [Samuels G.J. 1990] : same loc. -*Samuels G.J.* 4509 [Samuels G.J. 1990] : Centre ORSTOM - Cayenne. -*Samuels G.J. & Searwar P.* 4351 [Samuels G.J. 1986] : Lieu-Dit Citron - Paul Isnard area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5726a [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Nectria mammiformis (Chardon)Samuels

-*Samuels G.J.* 3935 [Samuels G.J. 1990] : Piste de Saint-Elie. -*Samuels G.J.* 4018 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2762 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2905a [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3199 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 3034 [Samuels G.J. 1986] : Mont Galbao - Saül area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5712 [Samuels G.J. 1988] : Ouman fou Langa Soula - Marouini River high basin.

Nectria mauritiicola (P. Hennings)Seifert & Samuels

-*Rossman A.Y. & Feuillet C.* 3142 : 40 km S of Cayenne - Montagne Cacao ; Piste Coralie. -*Samuels G. & Feuillet C.* 4562 [Samuels G.J. 1986] : Montagne Cacao - Comté River basin. -*Samuels G.J.* 3568 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3927 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 3929 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2876 [Samuels G.J. & Boise J.R. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3552 [Samuels G.J. 1986] : same loc.

Nectria neogrammicospora Samuels

-*Samuels G.J.* 3706 [Samuels G.J. 1987] : 7km toward Mont Galbao, SW of Saül - Saül area (HOLOTYPE NY).

Nectria ochroleuca (Schweinitz)Berkeley & Curtis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3083 : Saint-Laurent-du-Maroni - Piste de Paul Isnard. -*Rossman A.Y. & Feuillet C.* 3216 : Rémiré - 15 km from Cayenne ; Trail to Vidal old farm. -*Rossman A.Y.* 3334 [Samuels G.J.] : Rémiré - Cayenne ; same area. -*Samuels G. & Feuillet C.*4431[Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3448 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3528 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3582 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3638 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3650 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3666 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 4012 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2647b [Samuels G.J. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2667 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2729 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2781 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2822 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2967 [Samuels G.J. 1987] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2976 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 3381 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4176 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4217a [Samuels G.J. & Searwar P. 1990] : Massif du Dékou-Dékou - same are. -*Samuels G.J. & Searwar P.* 4231 [Samuels G.J. 1986] : same loc. -*Samuels G.J. &*

Searwar P. 4240 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4291 [Samuels G.J. 1986] : Massif Lucifer - same area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5746 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin.

Nectria olivacea (Seaver)Samuels

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2944 : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2955 [Samuels G.J. 1987] : same loc. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3080 [Samuels G.J. 1986] : Saint-Laurent-du-Maroni - Piste de Paul Isnard.

Nectria penicilliferi Samuels

-*Samuels G.J.* 3896a [Samuels G.J. 1988] : Piste de Saint-Elie.

Nectria pertusa Patouillard

-*Samuels G.J.* 3961 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2999 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6190 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Nectria pityrodes (Montagne)Montagne

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3027 [Samuels G.J.] : Trail to Mont Galbao, between Crique Cambrouze and Crique Eau Noire - Saül area. -*Rossman A.Y. & Feuillet C.* 3102 [Rossman A.Y.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. -*Rossman A.Y. & Feuillet C.* 3303 : Piste de Saut Leodate. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4084 : Saint-Laurent-du-Maroni - Piste de Paul Isnard. -*Samuels G.J.* 3480 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3536 [Samuels G.J. 1990] : same loc. -*Samuels G.J.* 4008 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2637 [Samuels G.J. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2680 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3002 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3186 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3256 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3323 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3342 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 3093 [Samuels G.J. 1986] : Mont Galbao - Saül area. -*Samuels G.J. & Searwar P.* 4157 [Samuels G.J. & Searwar P. 1990] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5982 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Nectria pseudocinnabarina Rossman

-*Samuels G.J. & Searwar P.* 4299 [Samuels G.J. 1988] : Massif Lucifer - Paul Isnard area.

Nectria pseudotrichia (Schweinitz)Berkeley & Curtis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3096 [Samuels G.J. 1987] : Route de Paul Isnard - Paul Isnard area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4090 : same loc. -*Rossman A.Y. & Feuillet C.* 3125 [Samuels G.J.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. -*Rossman A.Y. & Feuillet C.* 3165 [Samuels G.J.] : 40 km S of Cayenne - Montagne Cacao, Piste Coralie. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4036 : Saint-Laurent-du-Maroni - Piste Balaté. -*Samuels G. & Feuillet C.* 4533 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3483 [Samuels

G.J. 1990] : Montagne La Fumée - Saül area. -*Samuels G.J. & Boise J.R.* 2583 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2661 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2679 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 3183 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3302 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4261 [Samuels G.J. & Searwar P. 1990] : Massif Lucifer - Paul Isnard area. -*Huhndorf S.M.* 881 [Samuels G.J. 1994] : NE of Eau Claire - Saül area.

Nectria purtonii (Greville)Berkeley
-*Samuels G.J. & Boise J.R.* 2672 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area.

Nectria radicicola Gerlach & Nilsson
-*Samuels G. & Feuillet C.* 4435 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne.

Nectria rigidiuscula Berkeley & Broome
-*Rossman A.Y. & Feuillet C.* (without n°) : Piste de Saut Leodate. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2938 : Near Camp Caïman - Montagne de Kaw. -*Samuels G.J.* 3525 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3926 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 3321 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4185 [Samuels G.J. & Searwar P. 1990] : Camp minier Paul Isnard - Paul Isnard area.

Nectria rubrococca Brayford & Samuels
-*Samuels G. & Feuillet C.* 4484 [Brayford D. & Samuels G.J.] : ca. 50km route de l'Est - Montagne de Kaw area (HOLOTYPE NY).

Nectria rugulosa Patouillard & Gaillard
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3029 [Samuels G.J.] : Trail to Mont Galbao, between Crique Cambrouze and Crique Eau Noire - Saül area. -*Rossman A.Y. & Feuillet C.* 3267 : Route de Belizon - Track to Montagne Tortue. -*Samuels G.J.* 3509 [Samuels G.J. 1989] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3632 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 4026 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Searwar P.* 3038 [Samuels G.J. 1986] : Mont Galbao - Saül area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6159 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini ri-ver high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6177 [Samuels G.J. 1990] : same loc. -*Huhndorf S.M.* 693 [Samuels G.J. 1994] : N of Eau Claire - Saül area.

Nectria scitula H. Sydow
-*Courtecuisse R.* RC/GF88.671 [Samuels G.J. 1991] : Saut Pararé ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.686 [Samuels G.J. 1991] : same loc.

Nectria septospora Samuels & Brayford
-*Samuels G.J. & Boise* J. 3108 [Samuels G.J. & Brayford D.] : ca. 15km toward Mont Galbao, SW of Saül - Saül area (HOLOTYPE NY).

Nectria sesquicillii Samuels
-*Rossman A.Y. & Feuillet C.* 3204 [Samuels G.J.] : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. -*Rossman A.Y. & Feuillet C.* 3212 [Samuels G.J.] : same loc. -Samuels *G. & Feuillet C.* 4424 [Samuels G.J. 1986] : Montagne de Kaw. -*Sa-*

muels G.J. 3970 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Searwar P.* 4274 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area.

Nectria setofusariae Samuels & Nirenberg

-*Rossman A.* 3333 [Samuels G.J. 1988] : Rémiré - Cayenne area. -*Samuels G.J.* 4014 [Samuels G.J. 1986] : Piste de Saint-Elie (HOLOTYPE NY).

Nectria sp.

-*Rossman A.Y. & Feuillet C.* 3144 : 40 km S of Cayenne - Montagne Cacao ; Piste Coralie. -*Rossman A.Y. & Feuillet C.* 3181 : same loc. -*Rossman A.Y. & Feuillet C.* 3319 : Piste de Saut Leodate.

Nectria stilbellae Samuels & Seifert

-*Samuels G.J. & Boise J.R.* 2909 [Samuels G.J. 1990] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3079 [Samuels G.J. 1990] : Mont Galbao - Saül area (HOLOTYPE NY).

Nectria striispora Ellis & Everhart

-*Rossman A.Y. & Feuillet C.* 3230C : Route de Belizon - Track to Montagne Tortue. -*Samuels G. & Feuillet C.* 4377 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J.* 3620 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3684 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3834 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 3894 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2511 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2938 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3100 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4218 [Samuels G.J. & Searwar P. 1990] : Massif du Dékou-Dékou - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6186 [Samuels G.J. 1987] : 2km S of Monpé Soula, 15 min. walk W of the Marouini River, toward a large granitic rock, elev. ca 200m - Marouini River high basin. -*Huhndorf S.M.* 1000 [Samuels G.J. 1994] : NE of Eau Claire - Saül area.

Nectria subfalcata P. Hennings

-*Samuels G.J.* 3499 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J. & Boise J.R.* 2813 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area.

Nectria subquaternata Berkeley & Broome

-*Rossman A.Y. & Feuillet C.* 3224 [Samuels G.J.] : Route de Belizon - Track to Montagne Tortue.

Nectria suffulta Berkeley & Curtis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2881 [Samuels G.J. 1987] : Crique Cochon - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2958 [Samuels G.J. 1987] : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3011 [Samuels G.J.] : Mont Galbao ; between Crique Cambrouze and Crique Eau Noire - Saül area. -*Samuels G.J. & Searwar P.* 4310 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6020 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. - *Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6021 [Samuels G.J. 1990] : same loc. -Samuels *G.J., Granville J.-J. de, Allorge L. & al.* 6153 [Samuels G.J. 1990] : same loc.

Nectria sylvana Mouton

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6025 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6026 [Samuels G.J. 1990] : same loc.

Nectria triqua Samuels

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5818 [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin (HOLOTYPE NY).

Nectria vermispora Samuels & Brayford

-*Samuels G.J.* 4016 [Samuels G.J. & Brayford D.] : km16, between Sinnamary and St.Elie, 'ECEREX' ORSTOM research area. Piste de Saint-Elie (HOLOTYPE NY).

Nectria vilior Starbäck

-*Courtecuisse R.* RC/GF88.602 [Samuels G.J. 1991] : Saut Pararé ; Arataye River - Approuague basin. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2828 : Macouria - End of Saut Leodate Trail. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3092 [Rossman A.Y.] : Saint-Laurent-du-Maroni - Piste de Paul Isnard. -*Rossman A.Y. & Feuillet C.* 3140 : 40 km S of Cayenne - Montagne Cacao ; Piste Coralie. -*Samuels G. & Feuillet C.* 4393 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G. & Feuillet C.* 4487 [Samuels G.J. 1986] : same loc. -*Samuels G. & Feuillet C.* 4504 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3712 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3899 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2628 [Samuels G.J. 1986] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3008 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3182 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4129 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4326 [Samuels G.J. 1986] : Lieu-Dit Citron - same area. -*Huhndorf S.M.* 730 [Samuels G.J. 1994] : NE of Eau Claire - Saül area. -*Huhndorf S.M.* 887 [Samuels G.J. 1994] : Eau Claire - Saül area.

Nectriopsis Maire

Nectriopsis byssotecta (Rehm)Samuels

-*Samuels G.J. & Boise J.R.* 3107 [Samuels G.J. 1987] : 15km toward Mont Galbao, SW of Saül - Saül area.

Nectriopsis epimycota Samuels

-*Samuels G. & Feuillet C.* 4457 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3463 [Samuels G.J. 1987] : Montagne La Fumée - Saül area (HOLOTYPE NY). -*Samuels G.J.* 3651a [Samuels G.J. 1987] : Layon Grand Fossé - Saül area.

Nectriopsis leucorrhodina (Montagne)Samuels

-*Samuels G.J.* 3749 [Samuels G.J. 1990] : Montagne Boeuf Mort - Saül area.

Nectriopsis oropensoides (Rehm)Samuels

-*Samuels G.J.* 3982 [Samuels G.J. 1986] : Piste de Saint-Elie.

Ophionectria Saccardo

Ophionectria magniverrucosa Rossman

-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5722 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Ophionectria trichospora (Berkeley & Broome)Saccardo

-*Rossman A.Y. & Feuillet C.* 3230a : Route de Belizon - Track to Montagne Tortue. -*Samuels G.J.* 3631 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3860 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.*

3230 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3263 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4273 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area.

Peristomialis (Phillips)Boudier

Peristomialis berkeleyi Boudier

-*Samuels G.J.* 3763 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.* 3788 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3953 [Samuels G.J. 1986] : Piste de Saint-Elie.

Peristomialis paraparilis Samuels

-*Samuels G.J. & Searwar P.* 4159 [Samuels G.J. 1987] : Camp minier Paul Isnard - Paul Isnard area (HOLOTYPE NY).

Peristomialis parilis (H.Sydow)Samuels

-*Samuels G.J.* 3777 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J.& Searwar P.* 4158 [Samuels G.J. 1987] : Camp minier Paul Isnard - Paul Isnard area.

Podostroma P.Karsten

Podostroma eperuae Rogerson & Samuels

-*Samuels G.J.* 3821 [Samuels G.J. 1986] : Piste de Saint-Elie (HOLOTYPE NY).

Sarawakus Lloyd

Sarawakus lycogaloides (Berkeley)Lloyd

-*Samuels G.J. & Boise J.R.* 3368 [Samuels G.J., Rossman A.Y.] : toward Mont Galbao - Saül area. -*Samuels G.J.* 3739 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J. & Searwar P.* 4102 [Samuels G.J. 1987] : Camp minier Paul Isnard - Paul Isnard area.

HYPONECTRIACEAE

Linocarpon Sydow

Linocarpon livistoniae (Hennings)Hyde

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2967 [Boise J.R. 1987] : Saut Maïs - Saül area.

****Linocarpon verminosum*** (Montagne)Hyde

-Leprieur 1137, 1138 (HOLOTYPE PC *Sphaeria v.*) ; cited in Montagne 1854, Walker, 1980:61, Hyde, 1988:349

-*Samuels G.J. & Feuillet C.* 4505 [Huhndorf S.M. 1994] : Route de l'Est, ca. 50km - Montagne de Kaw area.

LASIOSPHAERIACEAE

Lasiosphaeria Cesati & De Notaris

Lasiosphaeria meznaensis Hilber

-*Samuels G.J. & Boise J.R.* 2642 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao - Saül area.

Lasiosphaeria moseri Hilber

-*Samuels G.J. & Boise J.R.* 3359 [Huhndorf S.M. 1994] : ca. 17.5km SW toward Mont Galbao - Saül area.

Lasiosphaeria raciborskii (Penzig & Saccardo)Caroll & Munk

-*Samuels G.J.* 3716 [Samuels G.J. 1990] : Layon Galbao - Saül area. -*Samuels G.J.* 3920 [Samuels G.J. 1986] : Piste de Saint-Elie

Lasiosphaeriella Sivanesan

Lasiosphaeriella dennisii Sivanesan
-*Samuels G.J.* 3950 [Samuels G.J. 1986] : Piste de Saint-Elie.

Lasiosphaeriella noonae-dana (Carroll & Munk)Sivanesan
-*Samuels G. & Feuillet C.* 4478 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J.* 3679 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3695 [Samuels G.J. 1986] : same loc. -*Samuels G.J.* 3865 [Samuels G.J. 1990] : Piste de Saint-Elie. -*Samuels G.J. & Searwar P.* 4208 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4323 [Samuels G.J. 1986] : Lieu-Dit Citron - same area. -*Samuels G.J. & Searwar P.*4361 [Samuels G.J. & Searwar P. 1990] : same loc.

Melanochaeta Müller, Harr & Sulmont

Melanochaeta hemispila (Berkeley & Broome)Müller, Harr & Sulmont
-*Huhndorf S.M.* 948A [Huhndorf S.M. 1994] : Grand Boeuf Mort trail - Saül area.

StriatosphaeriaSamuels & Müller

Striatosphaeria codinophora Samuels & Müller
-*Samuels G. & Feuillet C.* 4490 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J.* 3467 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 4030 [Samuels G.J. 1986] : Piste de Saint-Elie.

Thaxteria Saccardo

Thaxteria leptosporioides (Winter)Fitzpatrick
-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5830 [Huhndorf S.M. 1994] : vicinity of Roche Koutou - Marouini River high basin.

NIESSLIACEAE

Niesslia Auerswald

Niesslia erysipheoides (Ellis & Everhart)Barr
-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5727 [Huhndorf S.M. 1994] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5859 [Huhndorf S.M. 1994] : vicinity of Roche Koutou - same area.

Trichosphaerella Bommer, Rousseau & Saccardo

Trichosphaerella decipiens Bommer, Rousseau & Saccardo
-*Samuels G.J. & Searwar P.* 4230 [Samuels G.J. 1986] : Massif du Dékou-Dékou - Paul Isnard area.

Valetoniella Von Höhnel

Valetoniella crucipila Von Höhnel
-*Samuels G.J., Granville J.J. de, Allorge L. & al.*5710a [Samuels G.J. 1988] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5726b [Samuels G.J. 1987] : same loc.

NITSCHKIACEAE

Acanthonischkia Spegazzini

Acanthonischkia macrobarbata Fitzpatrick
-*Samuels G.J. & Searwar P.* 4236 [Samuels G.J. 1986] : Massif du Dékou-Dékou - Paul Isnard area. -*Samuels G.J.* 3904 [Huhndorf S.M. 1994] : between Sinnamary and St.Elie 'ECEREX', ORSTOM research area - Route de Saine-Elie area.

Bertia De Notaris

Bertia moriformis (Tode : Fries)De Notaris

-Rossman A.Y., Feuillet C. & Skog L.E. 2982 [Samuels G.J. 1987] : Mont La Fumée - Saül area.

var.latispora Corlett & Krug

-Rossman A.Y., Feuillet C. & Skog L.E. 2984 [Samuels G.J. 1987] : Mont La Fumée - Saül area. *-Samuels G.J.* 3599 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. *-Samuels G.J.* 3795 [Samuels G.J. 1986] : Piste de Saint-Elie. *-Samuels G.J.* 3851[Huhndorf S.M. 1994] : between Sinnamary and St.Elie 'ECEREX', ORSTOM research area - Route de Saint-Elie area. *-Samuels G.J.* 3476 [Huhndorf S.M. 1994] : Monts La Fumée - Saül area. *-Samuels G.J.* 3489 [Huhndorf S.M. 1994] : same loc. *-Samuels G.J. & Searwar P.* 4104 [Huhndorf S.M. 1994] : Citron, Mont Lucifer - Paul Isnard area. *-Samuels G.J. & Feuillet C.* 4530 [Huhndorf S.M. 1994] : vicinity of Cayenne - Cayenne area. *-Samuels G.J., Granville J.J. de, Allorge L. & al.* 5860 [Huhndorf S.M. 1994] : vicinity of Roche Koutou - Marouini River high basin. *-Huhndorf S.M.* 708 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area. *-Huhndorf S.M.* 876 [Huhndorf S.M. 1994] : 5km same loc. *-Huhndorf S.M.* 1043 [Huhndorf S.M. 1994] : NE of Eau Claire - Saül area.

Calyculosphaeria Fitzpatrick

******Calyculosphaeria calyculus*** (Montagne)Fitzpatrick

-Leprieur 372, 1218 (HOLOTYPE PC *Sphaeria c.*) ; cited in Montagne 1854 (sub nom. *Sphaeria*).

-Samuels G.J. & Boise J.R. 3334 [Huhndorf S.M. 1994] : ca. 17.5km SW toward Mont Galbao - Saül area. *-Samuels G.J.* 3550 [Huhndorf S.M. 1994] : vicinity of the village - Saül area. *-Samuels G.J. & Searwar P.* 4350 [Huhndorf S.M. 1994] : Citron - Paul Isnard area. *-Samuels G.J. & Feuillet C.* 4570 [Huhndorf S.M. 1994] : Montagne Cacao - Cacao area. *-Samuels G.J., deGranville J.J., Allorge L. & al.* 5646 [Huhndorf S.M. 1994] : Ouman Fou Langa Soula - Upper Marouini River area. *-Samuels G.J., deGranville J.J., Allorge L. & al.* 5988 [Huhndorf S.M. 1994] : same loc. *-Huhndorf S.M.* 918 [Huhndorf S.M. 1994] : Eau Claire - Saül area.

Calyculosphaeria collapsa (Romell)Fitzpatrick

-Samuels G.J. & Boise J.R. 2502 [Huhndorf S.M. 1994] : ca. 10km SW toward Mont Galbao -Saül area.

Gaillardiella Patouillard

Gaillardiella pezizoides Patouillard

-Samuels G.J. & Boise J.R. 3392 [Huhndorf S.M. 1994] : ca. 15km SW toward Mont Galbao -Saül area. *-Samuels G.J. & Boise J.R.* 4534 [Huhndorf S.M. 1994] : vicinity of Cayenne - Cayenne area.

Nitschkia Otth ex P.Karsten

Nitschkia acanthostroma (Montagne)Nannfeldt

-Rossman A.Y., Feuillet C. & Skog L.E. 4019a [Rossman A.Y.] : Saint-Laurent-du-Maroni - Road to Javouhey.

Nitschkia floridana Fitzpatrick

-Samuels G.J., deGranville J.J., Allorge L. & al. 6053 [Huhndorf S.M. 1994] : Monpe Soula - Upper Marouini River area. *-Huhndorf S.M.* 852 [Huhndorf S.M. 1994] : Eau Claire, S along Route de Belizon - Saül area.

Nitschkia grevillei (Rehm)Nannfeldt

-Rossman A.Y., Feuillet C. & Skog L.E. 2922 [Boise J.R. 1987] : Route de Belizon - Saül area.

Nitschkia macrospora Teng
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2983 [Boise J.R. 1987] : Montagne La Fumée - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2984 [Boise J.R. 1987] : Montagne La Fumée - Saül area.

Rhagadostroma Körber

Rhagadostroma coccifera (Arnaud)Müller
-*Rossman A.Y.* 4060 [Boise J.R. 1987] : Piste Balaté - 12 km from Saint-Laurent-du-Maroni.

OPHIOSTOMATACEAE

Ophiostoma H. & P.Sydow

Ophiostoma grande Samuels & Müller
-*Samuels G.J.* 4007 [Samuels G.J. 1986] : Piste de Saint-Elie.

Ophiostoma roraimense Samuels & Mueller
-*Samuels G.J.* 3810 [Samuels G.J. 1990] : Piste de Saint-Elie.

PHYLLACHORACEAE

Phyllachora Nitzschke ex Fuckel

**Phyllachora rhopalina* (Montagne)Saccardo
-Leprieur 441 ; cited in Montagne 1854 (sub nom. *Dothidea*) ; Dennis 1970:274

THYRIDIACEAE

Sinosphaeria Yue & O.Eriksson

Sinosphaeria lasiacidis Samuels & Rogerson
-*Samuels G.J.* 3724 [Samuels G.J. 1988] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3773 [Samuels G.J. 1988] : Bourg de Saül - Saül area. -*Samuels G.J.* 3784a [Samuels G.J. 1988] : same loc. (HOLOTYPE NY)

Valsaria Cesati & De Notaris

Valsaria rubricosa (Fries:Fries)Saccardo
-*Rossman A.Y.* 4013 [Boise J.R. 1986] : Road D9 - Between Saint-Laurent-du-Maroni and Mana.

TRICHOSPHAERIACEAE

Chaetosphaerella Müller & Booth

Chaetosphaerella phaeostroma (Durrieu & Montagne)Müller & Booth
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2923 [Boise J.R. 1986] : Route de Belizon.

Chaetosphaeria L.R. & C. Tulasne

Chaetosphaeria fusispora W.Gams & Holubova-Jechova
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3033 [Boise J.R. 1987] : Layon Galbao - Saül area.

Chaetosphaeria innumera Berkeley & Broome ex Tulasne
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3093 [Boise J.R. 1986] : Piste de Paul Isnard - Saint-Laurent-du-Maroni. -*Rossman A.Y.* 4068 [Boise J.R. 1986] : Piste Balaté - 12 km from Saint-Laurent-du-Maroni.

Chaetosphaeria myriocarpa (Fries:Fries)Booth
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3009 [Boise J.R. 1986] : Trail to Mont Galbao, between Crique Cambrouze and Crique Eau Noire - Saül area.

Chaetosphaeria pannicola Berkeley & Curtis
-*Samuels G.J. & Searwar P.* 4212 [Samuels G.J. & Searwar P. 1990] : Massif du Dékou-Dékou - Paul Isnard area.

Fluviostroma Samuels & Müller

Fluviostroma wrightii Samuels & Müller
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2917 [Samuels G.J.] : ? -*Samuels G.J.* 3691 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 4078 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Searwar P.* 4137 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Huhndorf S.M.* 851 [Huhndorf S.M. 1994] : S of Eau Claire - Saül area. -*Huhndorf S.M.* 949 [Huhndorf S.M. 1994] : Grand Boeuf Mort trail - Saül area.

XYLARIACEAE

Astrocystis Berkeley & Broome

Astrocystis mirabilis Berkeley & Broome
-*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5771 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin.

Camillea Fries

Camillea bilabiata Spegazzini
-*Samuels G. & Feuillet C.* 4559 [Samuels G.J. 1986] : Montagne Cacao - Comté River basin. -*Samuels G.J.* 3425 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3738 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.* 4017 [Samuels G.J.] : Saint-Laurent-du-Maroni - Road to Javouhey. - *Rossman A.Y., Feuillet C. & Skog L.* 4027 [Samuels G.J.] : same loc.

****Camillea cyclisca*** (Montagne)Laessoe, J.D. Rogers & Whalley
-Leprieur 1186 (HOLOTYPE PC *Hypoxylon c.*) ; cited in Montagne 1854 (sub nom. *Hypoxylon*), Laessoe & al. 1989:128 : Cayenne.

Camillea cyclops (Montagne)Montagne
-Leprieur 221 (HOLOTYPE PC), 1166, 1167 ; cited in Montagne 1854.
-*Samuels G. & Feuillet C.* 4432 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G. & Feuillet C.* 4433 [Samuels G. & Feuillet C. 1990] : same loc.

****Camillea fossulata*** (Montagne)Laessoe, J.D. Rogers & Whalley
-Leprieur 692 (HOLOTYPE PC *Hypoxylon f.*), 1188 ; cited in Montagne 1854 (sub nom. *Hypoxylon*) ; Laessoe & al. 1989:131 : circa Cayenne

****Camillea heterostoma*** (Montagne)Laessoe, J.D. Rogers & Whalley
-Leprieur 229 (HOLOTYPE PC *Hypoxylon h.*), 395, 1189, 1190, 1217 ; cited in Montagne 1854 (sub nom. *Hypoxylon*) ; Dennis 1970:299 ; Laessoe & al. 1989:134
-*Samuels G. & Feuillet C.* 4496 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J. & Boise J.R.* 2634 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4367 [Samuels G.J. 1986] : Lieu-Dit Citron - Paul Isnard area.

var. macrospora (Miller)Laessoe, J.D.Rogers & Whalley
-*Samuels G.J. & Boise J.R.* 2559 [Samuels G.J. 1986] : Commune de Saül - Saül area.

****Camillea labellum*** Montagne

-Leprieur 1179 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1970:296 ; Laessoe & al. 1989:136 : truncis emortuis ad oram sylvarum circa Cayenne

Camillea leprieuri (Montagne)Montagne

-Leprieur 243 (HOLOTYPE PC *Hypoxylon l.*) ; cited in Montagne 1854.

-*Jacquemin H.* 2059 : Commune de Sinnamary - coastal area. -*Jacquemin H.* 2651 : Mont Cabassou - Cayenne. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2892 : Crique cochon & Plateau La Douane - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2976 : Trail to Saut Maïs - Saül area. -*Samuels G.J.* 3605 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J.* 3658 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. -*Samuels G.J.* 3675 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J. & Boise J.R.* 2577 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2645 [Samuels G.J. 1986] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6069 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6070 [Samuels G.J. 1990] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5671 [Samuels G.J. 1990] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5823 [Samuels G.J. 1987] : Roche Koutou - same area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5878 [Samuels G.J. 1987] : same loc._-*Rossman A.Y., Feuillet C. & Skog L.E.* 2972 [Samuels G.J. 1987, s.n. *Hypoxylon melanaspis*] : Saut Maïs - Saül area.

Camillea mucronata Montagne

-Leprieur 1165 (HOLOTYPE PC) ; cited in Montagne 1854.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2938 : Trail to Saut Maïs, Carbet Mitan - Saül area. -*Rossman A.Y. & Feuillet C.* 3155 [Samuels G.J.] : 40 km S of Cayenne - Montagne Cacao, Piste Coralie. -*Samuels G. & Feuillet C.* 4406 [Samuels G. & Feuillet C. 1990] : Montagne de Kaw. -*Samuels G.J. & Boise J.R.* 3294 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3312 [Samuels G.J. 1986] : same loc.

Camillea obularia (Fries)Laessoe, J.D.Rogers & Lodge

-*Rossman A.Y., Feuillet C. & Skog L.* 2852a : Montagne de Kaw. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3050 [Boise J.R.] : Trail to Crique Limonade - Saül area. -*Samuels G.J. & Searwar P.* 4347 [Samuels G.J. 1986] : Lieu-Dit Citron - Paul Isnard area.

****Camillea scriblita*** (Montagne)Laessoe, J.D. Rogers & Whalley

-Leprieur 1162 (HOLOTYPE PC *Hypoxylon s.*) ; cited in Montagne 1854 (sub nom. *Hypoxylon*) ; Dennis 1970 : 299 ; Laessoe & al. 1989:143 : Cayenne.

****Camillea tinctor*** (Berkeley)Laessoe, J.D.Rogers & Whalley

-cited in Dennis 1970:299 ; Laessoe & al. 1989:145

Daldinia Cesati & De Notaris

****Daldinia concentrica*** (Bolton : Fries)Cesati & De Notaris

-Leprieur 249 ; cited in Montagne 1854 (doubtful)

var. escholzii (Ehrenberg)Starbäck

-*Rossman A.Y. & Feuillet C.* 3318 : Piste de Saut Leodate.

Hypoxylon Bulliard : Fries

Hypoxylon cyclopicum Spegazzini

-*Samuels G.J.* 4510 [Samuels G.J. 1986] : Centre ORSTOM - Cayenne. -*Samuels G.J. & Searwar P.* 4106 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4349 [Samuels G.J. 1986] : Lieu-Dit Citron - same area.

Hypoxylon glycirrhiza Berkeley & Curtis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2856 [Boise J.R. 1987] : Montagne du Matoury - Cayenne.

****Hypoxylon hypomiltum*** Montagne

-Leprieur 371 (HOLOTYPE PC) ; cited in Montagne 1854

****Hypoxylon monticulosum*** Montagne

-Leprieur 1176 (HOLOTYPE PC) ; cited in Montagne 1854

Hypoxylon nucigenum P. Hennings

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2945 [Samuels G.J. 1987] : Saut Maïs - Saül area. *Samuels G.J.* 3567 [Samuels G.J. 1990] : Montagne Boeuf Mort - Saül area. *Samuels G.J. & Boise J.R.* 2630 [Samuels G.J. 1986] : Commune de Saül - Saül area.-*Samuels G.J. & Boise J.R.* 2675 [Samuels G.J. & Boise J.R. 1990] : same loc.

Hypoxylon quisquilarium (Montagne)Montagne

-*Rossman A.Y. & Feuillet C.* 3111 [Samuels G.J.] : Rémiré - 15 km from Cayenne, trail to Vidal old farm. *Samuels G.J.* 3640 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area. *Samuels G.J.* 3689 [Samuels G.J. 1986] : Layon Galbao - Saül area. *Samuels G.J.* 3713 [Samuels G.J. 1986] : same loc. *Samuels G.J.* 3727 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J. & Searwar P.* 4296 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area. *Samuels G.J., Granville J.-J. de, Allorge L. & al.* 5974 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5941 [Samuels G.J. 1987] : Roche Koutou - same area.

****Hypoxylon rubiginosum*** (Persoon : Fries)Fries

-Leprieur 442 ; cited in Montagne 1854 (sub nom. *Hypoxylon vinosum*)

Hypoxylon sclerophaeum Berkeley & Curtis

-*Jacquemin H.* 1991 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2198 : Montagne du Mahury - Cayenne. -*Jacquemin H.* 2537 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2663 : Ile de Cayenne - Cayenne. - *Jacquemin H.* 2732 : Mont Cabassou - Cayenne.

Hypoxylon subannulatum P. Hennings & Nyman in Warburg

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3025 [Samuels G.J. 1987] : Layon Galbao - Saül area.

Hypoxylon sulcatum Starbäck

-*Samuels G.J. & Searwar P.* 4288 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area.

****Hypoxylon truncatum*** (Schweinitz)Miller

-Leprieur 230, 369, 397 ; cited in Montagne 1854 (sub nom. *Hypoxylon annulatum*)

Kretzschmaria Fries

Kretzschmaria clavus (Fries)Saccardo

-*Jacquemin H.* 2048 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2199 : Montagne du Mahury - Cayenne.

****Kretzschmaria lucidula*** (Montagne)Dennis

-Leprieur 430 (HOLOTYPE PC *Hypoxylon l.*) ; cited in Montagne 1854 (sub nom. *Hypoxylon*).

Leprieuria Laessoe, J.D.Rogers & Whalley

Leprieuria bacillum (Montagne)Laessoe, J.D. Rogers & Whalley
-Leprieur 1180 (HOLOTYPE PC *Camillea b.*) ; cited in Montagne 1854 (sub nom. *Camillea b.*)
-*Rossman A.Y.* 3236 [Rossman A.Y.] : Montagne Tortue - Route de Belizon. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2918 [Samuels G.J. 1987] : Route de Belizon - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4033 : Saint-Laurent-du-Maroni - Piste Balaté. -*Samuels G.J.* 3668 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6125 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5831 [Samuels G.J. 1989] : Roche Koutou - same area.

Neohypodiscus J.D.Rogers, Ju & Laessoe

****Neohypodiscus irradians*** (Montagne)J.D.Rogers, Ju & Laessoe
-Leprieur 231 (HOLOTYPE PC *Hypoxylon i.*) ; cited in Montagne 1854 (sub nom.*Hypoxylon i.*)

Penzigia Saccardo

****Penzigia conostoma*** (Montagne)Miller
-Leprieur 363 (HOLOTYPE PC *Hypoxylon c.*) ; cited in Montagne 1854 (sub nom. *Hypoxylon*).

****Penzigia indica*** Rawla & Narula 1984
-cited in Callan & Rogers 1990:366 (cf)

Phylacia Léveillé

Phylacia poculiformis (Montagne)Montagne
-*Rossman A.Y. & Feuillet C.* 3126 [Samuels G.J.] : Rémiré - 15 km from Cayenne, trail to Vidal old farm. -*Rossman A.Y. & Feuillet C.* 3194 [Samuels G.J.] : same loc. -*Samuels G. & Feuillet C.* 4507 [Samuels G.J. 1986] : Montagne de Kaw. -*Samuels G.J.* 3500 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3692 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Samuels G.J.* 3893 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J.* 3908 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Searwar P.* 4112 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6088 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Poronia Willdenow

****Poronia oedipus*** (Montagne)Montagne
-Leprieur without n° ; cited in Montagne 1854 (doubtful ?)

Thamnomyces Ehrenberg ex Sprengel

Thamnomyces chordalis Fries
-*Jacquemin H.* 2002 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2729 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2785 : Commune de Saül - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2974 : Beginning of Mont Galbao Trail - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3034 [Boise J.R. 1986] : Trail to Mont Galbao, between Crique Eau Noire and Crique Cambrouze - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3059 [Boise J.R. 1987] : Crique Limonade - Saül area. -*Rossman A.Y. & Feuillet C.* 3106 : Rémiré - 15 km from Cayenne, Trail to Vidal old farm. -*Samuels G.J.* 3615 [Samuels G.J. 1986] : Montagne Boeuf Mort - Saül area. -*Samuels G.J. & Boise J.R.* 3172 [Samuels G.J. 1986] : Bourg de Saül - Saül area.

Thamnomyces dendroideus Cooke & Massee

-*Jacquemin H.* 2003 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Samuels G.J.* 3922 [Samuels G.J. 1986] : Piste de Saint-Elie.

Theissenia Maublanc

Theissenia pyrenocratia (Theissen)Maublanc

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6169 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Ustulina L.R. & C. Tulasne

Ustulina deusta (Hoffmann : Fries)Petrak

-*Jacquemin H.* 2654 : Mont Cabassou - Cayenne. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2960 [Samuels G.J. 1987] : Saut Maïs - Saül area. -*Rossman A.Y. & Feuillet C.* 3148 : 40 km S of Cayenne - Montagne Cacao, Piste Coralie. -*Rossman A.Y. & Feuillet C.* 3304 : Piste de Saut Leodate.

Xylaria Hill ex Greville

*__*Xylaria adscendens*__ (Fries)Fries

-cited in Callan & Rogers 1990:346

*__*Xylaria aenea*__ (Montagne)Dennis

-Leprieur 1197, 1399 (HOLOTYPE PC) ; cited in Montagne 1854

Xylaria allantoidea (Berkeley)Fries

-*Jacquemin H.* 2019 : Trois-Sauts ; Wayampi village - Oyapock River high basin.

*__*Xylaria cf. allantoidea*__ (Berkeley)Fries

-cited in Callan & Rogers 1990:348

*__*Xylaria anisopleura*__ (Montagne)Montagne

-Leprieur 254, 438, 1194, 1198 ; cited in Montagne 1854

*__*Xylaria aristata*__ Montagne

-Leprieur 1209 ; cited in Montagne 1854

*__*Xylaria atrosphaerica*__ (Cooke & Massee)Callan & J.D. Rogers

-cited in Callan & Rogers 1990:350

*__*Xylaria axifera*__ Montagne

-Leprieur 1192 ; cited in Montagne 1854 ; Dennis 1970:303 (sub nom. *Xylosphaera*)

*__*Xylaria berkeleyi*__ Montagne

-Leprieur 1196, 1200, 1203 ; cited in Montagne 1854 ; Bertault 1984:145

*__*Xylaria coccophora*__ Montagne

-Leprieur 1228, 1398 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1970:304 (sub nom. *Xylosphaera*)

Xylaria comosa (Montagne)Fries

-*Jacquemin H.* 2017 : Trois-Sauts ; Wayampi village - Oyapock River high basin.

*__*Xylaria compressa*__ Patouillard & Gaillard

-cited in Bertault 1984:155

*__*Xylaria corniformis*__ (Fries)Fries

-Leprieur 1199, 1221 ; cited in Montagne 1854 (doubtful?)

Xylaria cubensis (Montagne)Fries

-*Jacquemin H.* 2643 : Ile de Cayenne - Cayenne.

*__*Xylaria curta*__ Fries

-Leprieur 236 ; cited in Montagne 1854 (sub nom. *Xylaria rhopaloides*) ; Callan & Rogers 1990:356 (cf)

*__*Xylaria enterogena*__ (Montagne)Fries

-cited in Callan & Rogers 1990:358

Xylaria feejensis (Berkeley)Fries
-Leprieur without n° ; cited in Montagne 1854 (sub nom. *Xylaria rhytidophloeus*)
Xylaria gracillima (Fries)Fries
-Leprieur 378, 384, 388 ; cited in Montagne 1854 (doubtful?)
Xylaria grammica (Montagne)Fries
-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6102 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5803 [Samuels G.J. 1990] : Roche Koutou - Marouini River high basin.
Xylaria guianensis (Montagne)Fries
-Leprieur 250 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Hypoxylon*)
Xylaria hypoxylon (Linné : Fries)Greville
-Leprieur 245, 248 ; cited in Montagne 1854 (doubtful)
Xylaria ianthino-velutina (Montagne)Fries
-Leprieur 574 ; cited in Montagne 1854
Xylaria kegeliana (Léveillé)Fries
-Leprieur 1214 ; cited in Montagne 1854
Xylaria microceras (Montagne)Fries
-Leprieur 242 ; cited in Montagne 1854
Xylaria multiplex (Kunze)Berkeley & Curtis
-Leprieur 223, 246, 247, 1193 ; cited in Montagne 1854
Xylaria obovata (Berkeley)Fries
-*Jacquemin H.* 2046 : Trois-Sauts : Wayampi village - Oyapock River high basin.
Xylaria phyllocharis Montagne
-Leprieur 1208 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1970:304 (sub nom. *Xylosphaera*).
Xylaria polymorpha (Persoon : Fries)Greville
-*Jacquemin H.* 1865 ter : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2019 bis : same loc. -*Jacquemin H.* 1934 : Montagne du Mahury - Cayenne. -*Jacquemin H.* 1935 : same loc.
Xylaria pumila (Fries)Montagne
-Leprieur 1210, 1211, 1212, 1213 ; cited in Montagne 1854
Xylaria rhizocola Montagne
-Leprieur 235 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1970:304 (sub nom. *Xylosphaera*).
Xylaria scopicola (Montagne ex P. Joly)T.Schumacher
-Leprieur 224, 228, 1129 ; cited in Montagne 1854 (sub nom. *Xylaria scopiformis*)
Xylaria scruposa (Fries)Fries
-Leprieur ; cited in Montagne (without n°).
Xylaria telfairi Berkeley
-*Jacquemin H.* 1865 bis : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2358 : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5775 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

C3 - *Pezizomycetideae* ('Discomycetes')

C3a - 'Inoperculate'

DERMATEACEAE

Angelina Fries

Angelina leprieuri Montagne
-Leprieur 869 (HOLOTYPE PC) ; cited in Montagne 1854.
-Granville J.J. de, Allorge L., Hahn W.J. & Hoff M. 9246 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. *-Granville J.J. de, Allorge L., Hahn W.J. & Hoff M.* 9544 [Samuels G.J. 1987] : Roche Koutou - Marouini River high basin.

GEOGLOSSACEAE

Microglossum Gillet

Microglossum rufum (Schweinitz)Underwood
-Leprieur 1075 ; cited in Montagne 1854 (sub nom. *Mitrula lutea*) ; Imai 1955 (sub nom. *Mitrula lutea*)

HYALOSCYPHACEAE

Lachnum Retz.

Lachnum abnorme (Montagne)Haines & Dumont
-Rossman A.Y., Feuillet C. & Skog L.E. 2916 : Route de Belizon.

Lachnum rhytismatis (Phillips)Nannfeldt
-Rossman A.Y., Feuillet C. & Skog L.E. 2929 [Haines J.H.] : Trail to Saut Maïs, Carbet Mitan - Saül area.

Proliferodiscus Haines & Dumont

Proliferodiscus inspersus (Berkeley & Curtis)Haines & Dumont
-Rossman A.Y., Feuillet C. & Skog L.E. 4026 : Saint-Laurent-du-Maroni - Road to Javouhey.

LEOTIACEAE

Bisporella Saccardo

Bisporella discedens (P.Karsten)Carpenter
-Rossman A.Y., Feuillet C. & Skog L. 3043 [Haines J.H.] : Mont Galbao - Saül area.

Cordierites Montagne

****Cordierites guianensis*** Montagne
-Leprieur 383, 885 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1970:279 ; Zhuang 1988:279.

Encoelia (Fr.:Fr.)P.Karsten

Encoelia cubensis (Berkeley & Broome)Iturriaga, Samuels & Korf
-Rossman A.Y. & Feuillet C. 3245 : Route de Belizon - Track to Montagne Tortue. -*Samuels G.J.* 3547 [Samuels G.J. 1986] : Bourg de Saül - Saül area. *-Samuels G.J.* 3932 [Samuels G.J. 1986] : Piste de Saint-Elie. *-Samuels G.J. & Boise J.R.* 2616 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. *-Samuels G.J. & Searwar P.* 3059 [Samuels G.J. 1986] : Mont Galbao - Saül area. - *Samuels G.J. & Searwar P.* 4109 [Samuels G.J. & Searwar P. 1990] : Camp minier Paul Isnard - Paul Isnard area. *-Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6165 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin.

Polydiscidium Wakefield

Polydiscidium martynii Wakefield
-Samuels G.J. & Searwar P. 4147 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area.

ORBILIACEAE

Orbilia Fries

Orbilia auricolor (Bloxam ex Berkeley)Saccardo

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2991 : Mont La Fumée - Saül area. - *Rossman A.Y., Feuillet C. & Skog L.E.* 3051 [Carpenter S.E.] : Trail to Crique Limonade - Saül area.

Orbilia sp.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 4038 [Haines J.H.] : Saint-Laurent-du-Maroni - Piste Balaté.

RHYTISMATACEAE

Coccomyces De Notaris

Coccomyces leptosporus Spegazzini

-*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6095 [Johnston J.R. 1990] : Ouman fou Langa Soula - Marouini River high basin.

SCLEROTINIACEAE

Lambertella Von Höhnel

Lambertella microscopica (Seaver)Dumont

-*Samuels G.J.* 4080 [Samuels G.J. 1990] : Piste de Saint-Elie.

Lanzia Saccardo

Lanzia rufocornea (Berkeley & Broome)Dumont

-*Courtecuisse R.* RC/GF88.070 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4006 : Saint-Laurent-du-Maroni - Mana.

Poculum Velenovsky

****Poculum crocatum*** (Montagne)Dumont

-Leprieur 439 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Peziza*) ; Dennis 1970:347 (sub nom. *Hymenoscyphus*) ; Dumont 1981:329

Rutstroemia P.Karsten

Rutstroemia sp.

-*Rossman A.Y., Feuillet C. & Skog L.E.* 4080 : Saint-Laurent-du-Maroni - Piste de Paul Isnard.

C3b - **'Operculate'**

PYRONEMATACEAE

Aleuria (Fries)Fuckel

****Aleuria phlyctidospora*** (Leprieur & Montagne)T. Schumacher

-Leprieur (without n°) ; cited in T.Schumacher, 1988 : "Cayenne in locis sabulosis".

Pulvinula Boudier

Pulvinula anthracobia T.Schumacher

-*Courtecuisse R.* RC/GF88.075 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

****Pulvinula etiolata*** (Cooke)Legal

-cited in Dennis 1970:336

Scutellinia (Cooke)Lambotte

Scutellinia blumenaviensis (P.Hennings)Legal
-*Courtecuisse R.* RC/GF88.021 [Courtecuisse R. 1992] : Camp des Nouragues ; Arataye River - Approuague basin.

SARCOSCYPHACEAE

Cookeina O. Kuntze

Cookeina speciosa (Fries : Fries)R.W.G.Dennis (= *C.sulcipes*)
-*Courtecuisse R.* RC/GF88.029 [Courtecuisse R., 1988] : Camp des Nouragues - Approuague basin. -*Courtecuisse R.* RC/GF88.225 [Courtecuisse R., 1988] : Station de l'Arataye - Approuague basin. -*Jacquemin H.* 1864 bis : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2042 : same loc. -*Jacquemin H.* 2610 : Mont Cabassou - Cayenne. -*Samuels G.J.* 3470 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J.* 3787 [Samuels G.J. 1986] : Bourg de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4115 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4315 [Samuels G.J. 1986] : Massif Lucifer - Paul Isnard area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5805 [Samuels G.J. & Searwar P. 1990] : Roche Koutou - Marouini River high basin.

Cookeina tricholoma (Montagne)O. Kuntze
-*Broadway W.E.* 692 [Cash E.K.] : Cayenne. -*Chaud J.P.* 006 [Courtecuisse R. 1989] : Montagne des singes - Kourou. -*Courtecuisse R.* RC/GF88.004 [Courtecuisse R. 1988] : Camp des Nouragues - Approuague basin. -*Courtecuisse R.* RC/GF88.263 [Courtecuisse R. 1988] : Saut Pararé ; Arataye River - Approuague basin. -*D'Halluin C.* 013 [Courtecuisse R. 1993] : Camp Voltaire - Paul Isnard area. -*Jacquemin H.* 1864 ter : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 1960 : Route Nationale RN 2. -*Jacquemin H.* 2611 : Mont Cabassou - Cayenne. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2946 [Haines J.H.] : Saut Maïs - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4063 [Haines J.H.] : Saint-Laurent-du-Maroni - Piste Balaté. -*Samuels G. & Feuillet C.* 4408 [Samuels G. & Feuillet C. 1990] : Montagne de Kaw. -*Samuels G.J. & Boise J.R.* 2715 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4126 [Samuels G.J. 1986] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4220 [Samuels G.J. & Searwar P. 1990] : Massif du Dékou-Dékou - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6012 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6013 [Samuels G.J. 1987] : same loc. -*Sipman H.* 31839 [Courtecuisse R. 1992] : Piste de St.Elie - near Sinnamary.

SARCOSOMATACEAE

Phillipsia Berkeley

Phillipsia tetraspora (Seaver)Legal
-*Samuels G.J. & Searwar P.* 4113 [Samuels G.J. 1987] : Camp minier Paul Isnard - Paul Isnard area.

D - BASIDIOMYCOTINA

D1 - Phragmobasidiomycetes and other 'Heterobasidiomycetes'

AURICULARIACEAE

Auricularia Bulliard

Auricularia delicata (Fries)Hennings

-*Courtecuisse R.* RC/GF88.354 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.457 [Courtecuisse R. 1990] : same loc. -*Samuels G.J. & Boise J.R.* 2606 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Searwar P.* 4271 [Lowy B. 1987] : Massif Lucifer - Paul Is-nard area. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5895 [Samuels G.J. 1990] : Roche Koutou - Marouini River high basin.

Auricularia fuscosucccinea (Montagne)Farlow

-*Broadway* 762 [Lowy B. 1971] : Cayenne.

Auricularia polytricha (Montagne)Saccardo

-*Courtecuisse R.* RC/GF88.353 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.527 [Courtecuisse R. 1990] : same loc. -*Courtecuisse R.* RC/GF88.562 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Ap-prouague basin. -*Jacquemin H.* 1958 : Route Nationale RN 2. -*Jacquemin H.* 2156 : Piste de Saint-Elie. -*Samuels G.J.* 3685 [Samuels G.J. 1986] : Layon Galbao - Saül area. -*Sa-muels G.J.* 3711 [Samuels G.J. 1986] : same loc. -*Samuels G.J. & Boise J.R.* 2763 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3188 [Lowy B. 1987] : Bourg de Saül - Saül area. -*Samuels G.J. & Searwar P.* 3053 [Lowy B. 1987] : Mont Galbao - Saül area. -*Samuels G.J. & Searwar P.* 4099 [Lowy B. 1987] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4135 [Lowy B. 1987] : Camp minier Paul Isnard - Paul Isnard area. -*Samuels G.J. & Searwar P.* 4335 [Lowy B. 1987] : Lieu-Dit Citron - same area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6121 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5711 [Samuels G.J. 1988] : same loc.

DACRYMYCETACEAE

Calocera (Fries : Fries)Fries

Calocera coralloides Kobayasi

-*Courtecuisse R.* RC/GF88.503 [Courtecuisse R. & B.Lowy 1990] : Saut Pararé ; Arataye River - Approuague basin.

Dacryopinax Martin

Dacryopinax formosus Lowy & Courtecuisse

-*Courtecuisse R.* RC/GF88.227 [Lowy B. & Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin (HOLOTYPE PC).

Dacryopinax indacocheae Lowy

- *Courtecuisse R.* RC/GF88.093 [Lowy B. 1990] : Station des Nouragues ; Arataye River - Approuague basin.

Dacryopinax martinii Lowy

-*Samuels G.J.* 3742 [Lowy B. 1987] : Montagne Boeuf Mort - Saül area.

Dacryopinax spathularia (Schweinitz)Martin

-*Courtecuisse R.* RC/GF88.040 [Courtecuisse R. 1990] : Station des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.157 [Lowy B. 1990] : same loc.

Ditiola Fries : Fries

Ditiola radicata (Albertini & Schweinitz : Fries)Fries
-*Courtecuisse R.* RC/GF88.419 [Lowy B. 1990] : Saut Pararé ; Arataye River - Approuague basin. -*Samuels G. & Feuillet C.* 4437 [Lowy B. 1987] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3979 [Lowy B. 1987] : Piste de Saint-Elie.

SEPTOBASIDIACEAE

Septobasidium Patouillard
****Septobasidium leprieuri*** (Montagne)Patouillard
-Leprieur 529 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom.*Corticium*) ; Dennis 1970:134
****Septobasidium rhabarbarinum*** (Montagne)Bresadola
-Leprieur 241 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Daedalea*) ; Ryvarden 1982:81 (type)

TREMELLACEAE

Heterochaete Patouillard in Patouillard & Lagerheim
****Heterochaete andina*** Lagerheim & Patouillard
-cited in Dennis 1970:128
Heterochaetella (Bourdot)Bourdot & Galzin
Heterochaetella cystidiophora Lowy
-*Samuels G. & Feuillet C.* 4389 [Lowy B. 1987] : Montagne de Kaw.
Pseudohydnum P.Karsten
Pseudohydnum gelatinosum (Scopoli : Fries)P.Karsten
-*Samuels G.J.* 3841 [Lowy B. 1987] : Piste de Saint-Elie.
var. bisporum Lowy & Courtecuisse
-*Courtecuisse R.* RC/GF88.273 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin (HOLOTYPE PC).
Tremella Persoon
****Tremella aurantia*** Schweinitz : Fries
-Leprieur 873 ; cited in Montagne 1854 (needs confirmation ?)
Tremella fibulifera A. Möller
-*Courtecuisse R.* RC.GF88.151 [Courtecuisse R. 1990] : Station des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.452 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - same area. -*Samuels G.J.* 3797 [Lowy B. 1987] : Piste de Saint-Elie. -*Samuels G.J.* 3808 [Lowy B. 1987] : same loc.
Tremella fimbriata Fries
-*Courtecuisse R.* RC/GF88.576 [Lowy B. 1990] : Saut Pararé ; Arataye River - Approuague basin.
Tremella lutescens Fries
-*Courtecuisse R.* RC/GF88.284 [Lowy B. 1990] : Saut Pararé ; Arataye River - Approuague basin.
Tremella tubercularia Berkeley
-*Samuels G.J. & Boise J.R.* 2635 [Lowy B. 1987] : Commune de Saül - Saül area

D2 - **Homobasidiomycetes**
D2a - ***Aphyllophoromycetideae***
APHELARIACEAE

Aphelaria Corner

Aphelaria guadeloupensis (Léveillé)Corner

-*Jacquemin H.* 2035 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2400 : Montagne de Kaw.

***Aphelaria tropica** (Montagne)Corner

-Leprieur 894 p.p. (HOLOTYPE PC sub nom. *Pterula*) ; cited in Corner 1950:191. -Leprieur 18, 895 (s.n. *Pterula acutissima*) ; cited in Corner l.c.

ATHELIACEAE

Athelia Persoon

Athelia rolfsii (Curzi)Tu & Kimbrough

-*Mailloux M.* [Lentz P.L. s.n.*Pellicularia r.*] : Cayenne.

BJERKANDERACEAE

Hapalopilus P.Karsten

***Hapalopilus phlebiaeformis** (Cooke)Ryvarden

-cited in Dennis 1970:119 (sub nom. *Poria*)

Hapalopilus rutilans (Persoon : Fries)P. Karsten

-*Jacquemin H.* 2053 : Piste de Saint-Elie.

CANTHARELLACEAE

Cantharellus Adanson : Fries

***Cantharellus guianensis** Montagne

-Leprieur 1062 (HOLOTYPE PC) ; cited in Montagne 1854 ; Corner 1966:46 ; Dennis 1970:87 ; Pegler 1983a:40

Caripia O. Kuntze

Caripia montagnei (Berkeley)O. Kuntze

-*Broadway W.E.* 768 : Cayenne. -*Chaud J.P.* 006 [Courtecuisse R. 1989] : Montagne des singes - Kourou area. -*Courtecuisse R.* RC/GF88.207 [Courtecuisse R. 1989] : Station de l'Arataye ; Saut Pararé - Approuague basin. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2858 [Pegler D.N. 1987] : Montagne du Mahury - Cayenne. -*Samuels G. & Feuillet C.* 4447 [Samuels G.J. 1986] : Commune de Cayenne - Cayenne. -*Samuels G.J.* 3990 [Samuels G.J. 1986] : Piste de Saint-Elie. -*Samuels G.J. & Boise J.R.* 2739 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 3111 [Samuels G.J. 1986] : Bourg de Saül - Saül area. *Samuels G.J. & Boise J.R.* 3174 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5725 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5804 [Samuels G.J. 1987] : Roche Koutou - same area.

CLAVARIACEAE

Clavaria Fries : Fries

Clavaria bisterigmatica R.H.Petersen & R. Courtecuisse

-*Courtecuisse R.* RC/GF88.098 [Petersen R.H. & Courtecuisse R. 1991] : Camp des Nouragues ; Arataye River - Approuague basin (HOLOTYPE TENN).

FAVOLASCHIACEAE

Favolaschia (Patouillard)Patouillard

Favolaschia auriscalpium (Montagne) Hennings

-Leprieur 961 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Laschia*) ; Dennis 1970:44 ; Singer 1974:31

Favolaschia fendleri Singer

-*Rossman A.Y. & Feuillet C.* 3271 [Pegler D.N. 1988] : Route de Belizon ; Track to Montagne Tortue.

GANODERMATACEAE

Amauroderma Murrill

Amauroderma auriscalpium (Persoon)Patouillard

-*Samuels G. & Feuillet C.* 4465 [Farr M.L. 1986] : Montagne de Kaw.

Amauroderma omphalodes (Berkeley)Torrend

-*Jacquemin H.* 1978 : Route Nationale RN 2.

Amauroderma rugosum (Blume & Nees : Fr.)Torrend

-Leprieur 862 ; cited in Montagne (sub.nom. *Polyporus*).

****Amauroderma schomburgkii*** (Patouillard)Torrend

-Leprieur without n° ; cited in Montagne 1854 (sub nom. *Polyporus schomburgkii*) ; Ryvarden 1981 (type of *Polyporus heteromorphus* Lév. = *Amauroderma schomburgkii*)

Ganoderma P.Karsten

****Ganoderma australe*** (Fries : Fries)Patouillard

-Leprieur 584 ; cited in Montagne 1854 (sub nom. *Polyporus*) (doubtful)

****Ganoderma fornicatum*** (Fries)Patouillard

-Leprieur 857, 860 ; cited in Montagne 1854 (sub nom. *Polyporus*) (doubtful)

Ganoderma lipsiense (Batsch)Atkinson

-*Jacquemin H.* 1939 : Montagne du Mahury - Cayenne.

Ganoderma lucidum (Leysser : Fries)P. Karsten

-*Jacquemin H.* 1979 : Route Nationale RN 2.

Ganoderma multiplicatum (Montagne)Patouillard

-*Jacquemin H.* 2530 : Ile de Cayenne - Cayenne.

Ganoderma oerstadii (Fries)Torrend

-*Jacquemin H.* 1911 : Crique Matakine- ? - Oyapock River high basin. -*Jacquemin H.* 2196 : Montagne du Mahury - Cayenne. -*Jacquemin H.* 2748 : Ile de Cayenne - Cayenne. -*Jacquemin H.* 2768 : Piste de Saint-Elie.

Ganoderma opacum (Berkeley & Montagne)Patouillard

-*Jacquemin H.* 2039 : Trois-Sauts ; Wayampi village - Oyapock River high basin.

Ganoderma testaceum (Léveillé)Patouillard

-*Jacquemin H.* 1981 : Route Nationale RN 2. -*Jacquemin H.* 2038 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2195 : Montagne du Mahury - Ca-yenne. -*Jacquemin H.* 2202 : Piste de Saint-Elie. -*Jacquemin H.* 2747 : same loc. -*Jac-quemin H.* 2884 : same loc. -*Jacquemin H.* 2475 : Crique Malmanoury - Coastal area. -*Jacquemin H.* 2536 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2656 : same loc. -*Jac-quemin H.* 2658 : same loc. -*Jacquemin H.* 2812 : same loc. -*Jacquemin H.* 2723 : same loc. -*Jacquemin H.* 2584 : Commune de Montsinéry - Cayenne area. -*Jacquemin H.* 2662 : Ile de Cayenne - Cayenne. -

Jacquemin H. 2694 : same loc. . - *Jacquemin H.* 2784 : Commune de Saül - Saül area. -*Jacquemin H.* 2797 : Lieu-Dit Citron - Paul Isnard area.

Ganoderma tornatum (Persoon)Bresadola

-*Jacquemin H.* 1939 bis : Montagne du Mahury - Cayenne. -*Jacquemin H.* 2448 : Ile de Cayenne - Cayenne.

Haddowia Steyaert

*****Haddowia longipes*** (Léveillé)Steyaert

-Léveillé 853 ; cited in Montagne 1854 (sub nom. *Polyporus*) ; Ryvarden & Johansen 1980:93 ; Ryvarden 1981:182 (type)

GOMPHACEAE

Gloeocantharellus Singer

Gloeocantharellus corneri (Singer)R.H. Petersen

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2942 [Pegler D.N. 1987] : Saut Maïs - Saül area.

Gomphus Persoon

*****Gomphus viridis*** (Patouillard)Singer

-cited in Corner 1966:178

HYMENOCHAETACEAE

Coltricia S.F.Gray

*****Coltricia fragilissima*** (Montagne)Ryvarden

-Leprieur 951 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Polyporus*) ; Ryvarden 1982:78

*****Coltricia spathulata*** (Hooker)Murrill

-Leprieur 939 ; cited in Montagne 1854 (sub nom. *Polyporus multiformis*) ; Ryvarden 1982:80 (type of *Polyporus multiformis*)

Cyclomyces Fries

*****Cyclomyces fuscus*** Fries

-Leprieur 938 ; cited in Montagne 1854 (sub nom. *Polyporus campyloporus*) ; Ryvarden 1982:76 (HOLOTYPE PC of *Polyporus campyloporus*)

*****Cyclomyces iodinus*** (Montagne)Patouillard

-Leprieur 532 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Polyporus*) ; Ryvarden 1982:78

Hymenochaete Léveillé

*****Hymenochaete berkeleyana*** (Montagne) Cooke

-Leprieur without n° (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Stereum*) ; Dennis 1970:87

*****Hymenochaete rheicolor*** (Montagne)Léveillé

-Leprieur 912 ; cited in Montagne (sub nom. *Stereum*)

Inonotus P.Karsten

*****Inonotus splitbergeri*** (Montagne)Ryvarden

-Leprieur without n° ; cited in Montagne 1854 (sub nom. *Polyporus*)

Phellinus Quélet

*****Phellinus gilvus*** (Schweinitz)Patouillard

-Leprieur 423, 539 ; cited in Montagne 1854 (sub nom. *Polyporus omalopilus*) ; Ryvarden 1982:80 (type of *P.omalopilus*)

var. licnoides (Montagne)Corner
-Leprieur 685 (HOLOTYPE PC), 937, 949, 965 ; cited in Montagne 1854 (sub nom. *Polyporus licnoides*)

Stipitochaete Ryvarden

Stipitochaete damaecornis (Link)Ryvarden
-Leprieur 541 ; cited in Montagne (sub nom. *Stereum damaecornis* and *Thelephora speciosa*).

Stipitochaete reniformis (Fries)Ryvarden
-*Courtecuisse R.* RC/GF88.014 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.579 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - same area.

LACHNELLACEAE

Rectipilus Agerer

Rectipilus confertus (Burt)Agerer
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2947 [Pegler D.N. 1987] : Saut Maïs - Saül area.

LACHNOCLADIACEAE

Lachnocladium Léveillé

****Lachnocladium tubulosum*** (Fries) Léveillé
-Leprieur 475 ; cited in Montagne 1854 (sub nom. *Clavaria*) ; Dennis 1970:93 (sub nom. *Ramaria*).

LENTARIACEAE

Lentaria Corner

****Lentaria mucida*** (Persoon : Fries)Corner
-Leprieur 909 ; cited in Montagne 1854 (sub nom. *Clavaria*)

****Lentaria surculus*** (Berkeley)Corner
-Leprieur 898, 900, 903 ; cited in Montagne 1854 (sub nom. *Clavaria furcellata*). -Leprieur 901 ; cited in Montagne 1854 (sub nom. *Clavaria surculus*).

PODOSCYPHACEAE

Aquascypha Reid

Aquascypha hydrophora (Berkeley)Reid
-*Jacquemin H.* 2167 : Ile d' Antecume Pata - Litani River basin. -*Samuels G.J. & Boise J.R.* 2736 [Samuels G.J. & Boise J.R. 1990] : Commune de Saül - Saül area. -*Samuels G.J. & Boise J.R.* 2737 [Samuels G.J. & Boise J.R. 1990] : same loc. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6161 [Samuels G.J. 1990] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.J. de, Allorge L. & al.* 5852 [Samuels G.J. 1990] : Roche Koutou - same area.

Cotylidia P. Karsten

Cotylidia spectabilis (Léveillé)Courtecuisse R. **nov.comb.**
Basionyme = *Thelephora spectabilis* Léveillé 18434 Ann.Sci.Nat., Bot. III,2:206
= *Cotylidia aurantiaca* (Persoon) Whelden (invalid : *Thelephora aurantiaca* Persoon 1827, basionym of this combination is preoccupied by *Thelephora aurantiaca* (Persoon)Persoon 1801)

-*Jacquemin H.* 2062 : Ile de Cayenne - Cayenne.

Cymatoderma Junghuhn

Cymatoderma dendriticum (Persoon)Reid

-*Broadway W.E.* 602 : Cayenne.

Podoscypha Patouillard

Podoscypha brasiliensis Reid

-*Courtecuisse R.* RC/GF88.264 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin.

Podoscypha macrorhiza (Léveillé)Patouillard

-cited in Reid 1965:193

Podoscypha nitidula (Berkeley)Patouillard

-*Jacquemin H.* 2326 : Trois-Sauts ; Wayampi village - Oyapock River high basin.

Stereopsis Reid

Stereopsis hiscens (Berkeley & Ravenel)Reid

-*Jacquemin H.* 2318 : Trois-Sauts ; Wayampi village- Oyapock River high basin.

Stereopsis radicans (Berkeley)Reid

-Leprieur 910 ; cited in Montagne 1854 (sub nom. *Thelephora*) ; Reid 1965:314

POLYPORACEAE (s.l.)

Ceriporia Donk

Ceriporia spissa (Schweinitz)Rajchenberg

-Leprieur 1065 ; cited in Montagne 1854 sub nom. *Polyporus cruentus*) ; Ryvarden 1982:77 (type of *Polyporus cruentus*)

Coriolopsis Murrill

Coriolopsis asper (Junghuhn)Teng

-Leprieur 1070 ; cited in Montagne (sub nom. *Polyporus hostmanii*).

Coriolopsis occidentalis (Klotzsch)Murrill

-*Broadway W.E.* 576 [Weir J.R.] : Cayenne.

Daedalea Persoon : Fries

Daedalea aethalodes (Montagne)Rajchenberg

-Leprieur 920 ; cited in Montagne 1854 (sub nom. *Polyporus phaeoporus*) ; Ryvarden 1982:80 (HOLOTYPE PC of *Polyporus phaeoporus*)

Datronia Donk

Datronia caperata (Berkeley)Ryvarden

-Leprieur 919, 928 ; cited in Montagne 1854 (sub nom. *Polyporus*) (doubtful)

Earliella Murrill

Earliella scabrosa (Persoon)Gilbertson & Ryvarden

-*Jacquemin H.* 2698 : ?

Echinochaete Reid

Echinochacte brachypora (Montagne)Ryvarden

-Leprieur 371 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Polyporus*) ; Ryvarden 1982:76.

-*Samuels G.J.* 3617 [Samuels G.J. 1986] : Layon Grand Fossé - Saül area.

Favolus Beauvais

Favolus brasiliensis (Fries:Fries)Fries

-*Broadway W.E.* 885 [Weir J.R.] : Cayenne.

Fomes (Fries)Fries

Fomes fasciatus (Swartz: Fries)Fries
-*Hariot V.* [Lloyd C.G. s.n. *F.marmoratus*] : ?
Gloeophyllum (P.Karsten)P.Karsten
Gloeophyllum striatum (Swartz : Fries)Murrill
-*Jacquemin H.* 2092 : Savane Matiti - Coastal area.
Hexagonia Pollini
*****Hexagonia hydnoides*** (Swartz : Fries)K.Fidalgo
-Leprieur 918, 9465, 947 ; cited in Montagne 1854 (sub nom. *Trametes*) ; David & Rajchenberg 1985:302
Hexagonia tenuis (Hooker)Fries
-cited in Ryvarden 1982:76 (sub nom. *Polyporus aculeatus* -HOLOTYPE PC)
-*Broadway W.E.* 862 (s.n.*Hexagona polygramma*) : Cayenne.
Hydnopolyporus Reid
*****Hydnopolyporus fimbriatus*** (Fries)Reid
-Leprieur 540 ; cited in Montagne 1854 (sub nom. *Polyporus*)
Microporellus Murrill
*****Microporellus dealbatus*** (Berkeley & Curtis)Murrill
-Leprieur 941 ; cited in Montagne 1854 (sub nom. *Polyporus*)
*****Microporellus obovatus*** (Junghuhn)Ryvarden
-Leprieur 659, 937 bis, 1066 ; cited in Montagne 1854 (sub nom. *Polyporus mutabilis*)
Oxyporus (Bourdot & Galzin) Donk
Oxyporus latemarginatus (Durieu & Montagne)Donk
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2814 [Pegler D.N. 1987] : Piste de Saut Léodate - Cayenne area.
Perenniporia Murrill
*****Perenniporia medulla-panis*** (Jacquin : Fries)Donk
-Leprieur 932 ; cited in Montagne 1854 (sub nom. *Polyporus*) (doubtful)
Polyporus Micheli ex Fries : Fries
*****Polyporus dictyopus*** Montagne
-cited in David & Rajchenberg 1985:308
Polyporus guianensis Montagne
-Leprieur 201 (HOLOTYPE PC) ; cited in Montagne 1854 ; Ryvarden 1982:78.
-*Jacquemin H.* 1977 : Route Nationale RN 2.
Polyporus leprieuri Montagne
-Leprieur 203 (HOLOTYPE PC) ; cited in Montagne 1854 ; Ryvarden 1982:79.
-*Jacquemin H.* 2437 : Piste Saut Léodate - Cayenne area.
Polyporus rhizomorphus Montagne
-Leprieur 202 (HOLOTYPE PC) ; cited in Montagne 1854 ; Ryvarden 1982:81.
-*Jacquemin H.* 2032 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2660 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2846 : Montagne de Kaw.
Polyporus tenuiculus (Beauvais)Fries
-*Jacquemin H.* 1996 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2273 : Colline de Bourda - Cayenne. -*Jacquemin H.* 2641 : Ile de Cayenne - Cayenne.
Polyporus tricholoma Montagne

-Leprieur 365 (HOLOTYPE PC) ; cited in Montagne 1854 ; Ryvarden 1982:82.
-*Courtecuisse R.* RC/GF88.564 [Courtecuisse R. 1989] : Saut Pararé ; Arataye River - Approuague basin. -*Jacquemin H.* 2065 : Piste de Saint-Elie.

Pycnoporus P.Karsten

Pycnoporus sanguineus (Linné : Fries)Murrill

-*Broadway W.E.* 145 : Cayenne. -*Broadway W.E.* 632 : Cayenne. -*Courtecuisse R.* RC/GF88.119 [Courtecuisse R. 1988] : Camp des Nouragues ; Arataye River - Approuague basin. -*D'Halluin C.* 022 [Courtecuisse R. 1993] : Cacao. -*D'Halluin C.* 024 [Courtecuisse R. 1993] : Cacao. -*Jacquemin H.* 1949 : Colline de Bourda - Cayenne. -*Jacquemin H.* 2055 : Piste de Saint-Elie. -*Jacquemin H.* 2805 : Lieu-Dit Citron - Paul Isnard area. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6072 [Samuels G.J. 1987] : Ouman fou Langa Soula - Marouini River high basin. -*Samuels G.J., Granville J.-J. de, Allorge L. & al.* 6073 [Samuels G.J. 1990] : same loc.

Pyrofomes Kotlaba & Pouzar

****Pyrofomes aurantiacus*** David & Rajchenberg

-David & Rajchenberg 1985:312 (HOLOTYPE PC).

Rigidoporus Murrill

****Rigidoporus microporus*** (Swartz : Fries)Van Overeem

-Leprieur 950 ; cited in Montagne 1854 (sub nom. *Polyporus micromegas*)
-Leprieur 966 ; cited in Montagne 1854 (sub nom. *Polyporus auriformis*) ; Ryvarden 1982:76 (HOLOTYPE PC of *Polyporus auriformis*)

****Rigidoporus ulmarius*** (Fries : Fries)Imazeki

-Leprieur 856 ; cited in Montagne 1854 (sub nom. *Polyporus actinobolus*) ; Ryvarden 1982:76 (HOLOTYPE PC of *Polyporus actinobolus*)

Rigidoporus zonalis (Berkeley)Imazeki

-*Jacquemin H.* 2021 : Trois-Sauts ; Wayampi village - Oyapock River high basin.

Trametes Fries

****Trametes cubensis*** (Montagne)Saccardo

-Leprieur 927 ; cited in Montagne 1854 (sub nom. *Polyporus*)

Trametes elegans (Sprengel : Fries)Fries

-*Jacquemin H.* 1929 : Ile de Cayenne - Cayenne. -*Jacquemin H.* 1967 : Route Nationale RN 2. -*Jacquemin H.* 2405 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2772 : Piste de Saint-Elie.

****Trametes menziesii*** (Berkeley)Ryvarden

-Leprieur 953 ; cited in Montagne (sub nom. *Polyporus diederichsenii*).

****Trametes modesta*** (Fries)Ryvarden

-Leprieur 913 ; cited in Montagne 1854 (sub nom. *Polyporus*)
-Leprieur 855, 868 ; cited in Montagne 1854 (sub nom. *Polyporus leiodermus*) ; Ryvarden 1982:79 (HOLOTYPE PC of *Polyporus leiodermus*).
-Leprieur 536, 1069 ; cited in Montagne 1854 (sub nom. *Polyporus monochrous*) ; Ryvarden 1982:79 (HOLOTYPE PC of *Polyporus monochrous*)
-Leprieur 923, 806 ; cited in Montagne 1854 (sub nom. *Polyporus brunneolus*).

Trametes sagraeana Montagne

-*Jacquemin H.* 2066 : Bourg de Roura - Montagne de Kaw.

Trametes versicolor (Linné : Fries)Lloyd

-*Jacquemin H.* 1936 : Montagne du Mahury - Cayenne. -*Jacquemin H.* 1989 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 1990 : same loc.
***_Trametes villosa_** (Hooker)Ryvarden
-Leprieur 934 ; cited in Montagne 1854 (sub nom. *Polyporus gibberulosus*) ; Ryvarden 1981:181 (type of *Polyporus gibberulosus*)
Trichaptum Murrill
Trichaptum byssogenum (Junghuhn)Ryvarden
-*Jacquemin H.* 2079 : Montagne du Mahury - Cayenne. -*Jacquemin H.* 2197 : same loc.
Trichaptum perrottetii (Léveillé)Ryvarden
-*Jacquemin H.* 1966 : Route Nationale RN 2. -*Jacquemin H.* 2056 : Piste de Saint-Elie. -*Jacquemin H.* 2637 : Ile de Cayenne - Cayenne.
***_Trichaptum sector_** (Ehrenberg : Fries)Kreisel
-Leprieur 964 ; cited in Montagne 1854 (sub nom. *Polyporus floridanus*)
-Leprieur 916, 960 ; cited in Montagne 1854 (sub nom. *Polyporus*) ; David 1970:317 ; David & Rajchenberg 1985:317

PTERULACEAE
Pterula Fries
***_Pterula dilatata_** (Montagne)Corner
-Leprieur 899 ; cited in Montagne 1854 (sub nom. *Calocera*)
***_Pterula taxiformis_** Montagne
-Leprieur 908 ; cited in Montagne 1854 (doubtful)

RAMARIACEAE
Ramaria S.F.Gray
***_Ramaria acutissima_** (Berkeley)Corner
-Leprieur 895 ; cited in Montagne 1854 (sub nom. *Clavaria*)
-Leprieur 897 ; cited in Montagne 1854 (sub nom. *Clavaria carbonaria*)
***_Ramaria albocinerea_** (Patouillard)Corner
-cited in Corner 1950:555
***_Ramaria cyanocephala_** (Berkeley & Curtis)Corner
-cited in Dennis 1970:93
***_Ramaria gigantea_** (Patouillard)R.H. Petersen
-cited in Petersen 1981:189
***_Ramaria guianensis_** (Patouillard)Corner
-*Melinon* 84 [Patouillard N.] : Maroni (HOLOTYPE FH) ; cited in Dennis 1970:93, Petersen 1981:75.
***_Ramaria insigne_** (Patouillard) R.H.Petersen
-*Melinon* 104 [Patouillard N.] : Maroni (HOLOTYPE FH) ; cited in Petersen 1981:77.
-Leprieur 445 ; cited in Montagne 1854 ; Petersen R.H. 1981:187, 190
***_Ramaria pancarribaea_** R.H. Petersen
-see Petersen R.H. 1981:192
***_Ramaria zippelii_** (Léveillé)Corner
-cited in Petersen R.H. 1981:187, 193

SCHIZOPHYLLACEAE

Phaeoschizophyllum W.B. Cooke

*_**Phaeoschizophyllum leprieuri**_ (Linder)W.B. Cooke

-cited in W.B.Cooke 1961:595

Schizophyllum Fries

**Schizophyllum commune** (Fries)Fries

-*Courtecuisse R.* RC/GF88.118 [Courtecuisse R. 1988] : Camp des Nouragues ; Arataye River - Approuague basin. -*Jacquemin H.* 2397 : Ile de Cayenne - Cayenne. -*Jacquemin H.* 2581 : Commune de Montsinéry - Cayenne area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 3071 : Saint-Laurent-du-Maroni - Piste de Paul Isnard. -*Rossman A.Y. & Feuillet C.* 3256 : Route de Belizon - Track to Montagne Tortue.

*_**Schizophyllum umbrinum**_ Berkeley

-Leprieur 1003, 1004 ; cited in Montagne 1854

STEREACEAE

Porostereum Pilat emend. Hjortstam & Ryvarden

**Porostereum papyrinum** (Montagne)Hjortstam & Ryvarden

-*Jacquemin H.* 2355 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2409 : Montagne du Mahury - Cayenne.

Stereum Persoon

**Stereum lobatum** (Kunze : Fries)Fries

-Leprieur 533 ; cited in Montagne 1854

THELEPHORACEAE

Hydnodon Banker

*_**Hydnodon thelephorus**_ (Léveillé)Banker

-Leprieur 914 ; cited in Montagne 1854 (sub nom. *Thelephora padinaeformis* ; HOLOTYPE PC)

D2b - ***Agaricomycetideae***

AGARICACEAE

Chlorophyllum Massee

**Chlorophyllum molybdites** (Meyer : Fries)Massee

-*Chaud J.P.* 08 [Courtecuisse R. 1989] : Saint-Laurent-du-Maroni. -*Jacquemin H.* 2639 : Ile de Cayenne - Cayenne.

Leucocoprinus Patouillard

*_**Leucocoprinus squamulosus**_ (Montagne)Pegler

-Leprieur without n° (HOLOTYPE) ; cited in Montagne 1854 (sub nom. *Hiatula*) ; Pegler 1983a:418

BOLBITIACEAE

Agrocybe Fayod

**Agrocybe broadwayi** (Murrill)Dennis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3069 [Pegler D.N. 1987] : Route de Paul Isnard - Paul Isnard area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4032 [Pegler D.N. 1987] : Road to Javouhey - Saint-Laurent-du-Maroni.

Conocybe Fayod

Conocybe siennophylla (Berkeley & Broome)Singer
-*Courtecuisse R.* RC/GF88.493 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin.

Panaeolus (Fries) Quélet

Panaeolus campanulatus (Linné : Fries)Quélet
-*Jacquemin H.* 2093 : Savane Matiti - Coastal area (doubtful).

BOLETACEAE

Boletinus Kalchbrenner

Boletinus decipiens (Berk. & Curt.®)Peck
-Leprieur without n°, sub nom. *Boletus* ; cited in Montagne 1854 (doubtful)

Fistulinella P.Hennings

Fistulinella venezuelae (Singer & Digilio)Singer
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2800 [Pegler D.N. 1987] : Macouria, near road D5 - road from Tonate to Montsinery.

Pulveroboletus Murrill

Pulveroboletus brachyspermus Pegler
-*Rossman A.Y.* 4487 [Pegler D.N. 1988] : ?

COPRINACEAE

Coprinus (Persoon)S.F.Gray

Coprinus lagopus (Persoon:Fries)Fries
-*Rossman A.Y.* 3303 [Pegler D.N. 1988] : ?

******Coprinus mirabilis*** Montagne
-cited in Montagne 1854 ; Pegler 1983a:474

Coprinus plicatilis (Curt.:Fries)Fries
-*Rossman A.Y.* 3328 [Pegler D.N. 1988] : Rémiré - 15 km from Cayenne ; trail to Vidal old farm.

Psathyrella (Fries)Quélet

Psathyrella annulosa Singer
-*Courtecuisse R.* RC/GF88.689 [Courtecuisse R. 1991] : Saut Pararé ; Arataye River - Approuague basin.

CREPIDOTACEAE

Galerina Earle

Galerina pectinata (Saccardo)R.Courtecuisse **nov.comb.**
Basionyme = *Naucoria pectinata* Berk.& Curt.→Saccardo 1887 Syll.Fung.5:856, based on *Agaricus pectinatus* Berk. & Curt. 1868 J.Linn.Soc. 10:291, non Schw. 1822
= *Galerina subpectinata* (Murrill) Smith & Singer 1964
-*Courtecuisse R.* RC/GF88.100 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin.

Pyrrhoglossum Singer

Pyrrhoglossum stipitatum Singer
-*Sipman H.* 31800 [Courtecuisse R. 1992] : Saül. -*Courtecuisse R.* RC/GF88.460 [Courtecuisse R. 1992] : Saut Pararé ; Arataye River - Approuague basin.

DERMOLOMATACEAE

Dennisiomyces Singer

Dennisiomyces griseus (Dennis)Singer

-*Courtecuisse R.* RC/GF88.122 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

Oudemansiella Spegazzini

Oudemansiella canarii (Junghuhn)Von Höhnel

-*Chaud J.P.* 13 [Courtecuisse R. 1989] : Saint-Laurent-du-Maroni. -*Courtecuisse R.* RC/GF88.001 [Courtecuisse R. 1988] : Cayenne - Quartier Chaton. -*Courtecuisse R.* RC/GF88.397 [Courtecuisse R. 1988] : Saut Pararé ; Arataye River - Approuague basin. -*D'Halluin C.* 005 [Courtecuisse R. 1993] : Acarouany.

ENTOLOMATACEAE

Entoloma (Fries)Kummer

Entoloma lycopersicum Horak & Singer

-*Courtecuisse R.* RC/GF88.143 [Horak E. 1992] : Camp des Nouragues ; Arataye River - Approuague basin.

Entoloma tucuchense Dennis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2941 [Pegler D.N. 1987] : Saut Maïs, 17 km E of Saül - Saül area.

Rhodocybe R. Maire

Rhodocybe testacea Dennis

-*Rossman A.Y. & Feuillet C.* 3292 [Pegler D.N. 1988] : Route de Belizon ; Track to Montagne Tortue.

HYGROPHORACEAE

Hygroaster Singer

Hygroaster nodulisporus (Dennis)R. Singer

-*Courtecuisse R.* RC/GF88.043 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

Hygrocybe (Fries) Kummer

Hygrocybe cheilocystidiata Courtecuisse

-*Courtecuisse R.* RC/GF88.593 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

*****Hygrocybe firma*** (Berkeley & Broome)R. Singer

-cited in Heim 1967:18

Hygrocybe guianensis Courtecuisse

-*Courtecuisse R.* RC/GF88.399 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

Hygrocybe hypohaemacta (Corner)Pegler

-*Courtecuisse R.* RC/GF88.465 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin.

Hygrocybe lilacinella Courtecuisse

-*Courtecuisse R.* RC/GF88.168 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin (HOLOTYPE PC).

Hygrocybe martinicensis Pegler & Fiard

-*Rossman A.Y. & Feuillet C.* 3179 [Pegler D.N.] : Montagne Cacao, Piste Coralie - 70 km E of Cayenne.

Hygrocybe miniata (Fries : Fries)Kummer

-*Rossman A.Y. & Feuillet C.* 3254 [Pegler D.N. 1988] : Route de Belizon - Track to Montagne Tortue. -*Rossman A.Y.* 3308 [Pegler D.N. 1988] : Piste de Saut Leodate.

Hygrocybe nigrescens var.brevispora (Dennis)Pegler

-*Rossman A.Y. & Feuillet C.* 3272 [Pegler D.N. 1988] : Route de Belizon -Track to Montagne Tortue. -*Rossman A.Y.* 4029 [Pegler D.N. 1987] : Road to Javouhey - Saint-Laurent-du-Maroni.

Hygrocybe nouraguensis Courtecuisse

-*Courtecuisse R.* RC/GF88.048 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin (HOLOTYPE PC).

Hygrocybe occidentalis (Dennis)Pegler

-*Courtecuisse R.* RC/GF88.045 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

Hygrocybe siparia (Berkeley)Singer

-*Courtecuisse R.* RC/GF88.398 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.545 [Courtecuisse R. 1989] : same loc. -*Courtecuisse R.* RC/GF88.545 bis [Courtecuisse R. 1989] : same loc.

Hygrocybe sp.-1

-*Courtecuisse R.* RC/GF88.230 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin.

Hygrocybe sp.-2

-*Courtecuisse R.* RC/GF88.349 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin.

Hygrocybe sp.-3

-*Courtecuisse R.* RC/GF88.408 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin.

Hygrocybe sp.-4

-*Courtecuisse R.* RC/GF88.438 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin.

Hygrocybe sp.-5

-*Courtecuisse R.* RC/GF88.054 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

Hygrocybe subflavida (Murrill)Pegler

-*Courtecuisse R.* RC/GF88.437 [Courtecuisse R. 1989] : Station de l'Arataye ; Arataye River - Approuague basin.

MARASMIACEAE

Chaetocalathus R. Singer

Chaetocalathus liliputianus (Montagne)Singer

-*Courtecuisse R.* RC/GF88.625 [Courtecuisse R. 1991] : Saut Pararé ; Arataye River - Approuague basin. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2874 [Pegler D.N. 1987] : Crique Cochon - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2877 [Pegler D.N. 1987] : Crique Cochon to Plateau La Douane - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 4079 [Pegler D.N. 1987] : Piste de Paul Isnard - 20 km from Saint-Laurent-du-Maroni. -*Samuels G.J., Granville J.J.de, Allorge L., Hahn W. & Hoff M.*5763[Halling R.E. 1992] : 2km N of Oumanfou Langa Soula - Marouini river high basin.

Collybia (Fries : Fries) Kummer

****Collybia neotropica*** Singer

-Leprieur 973 (HOLOTYPE PC *Marasmius longipes*) ; cited in Montagne 1854 (sub nom. *Marasmius longipes*) ; Dennis 1951:449 (sub nom. *Collybia longipes*)

****Collybia plectophylla*** (Montagne)Singer

-Leprieur 309 (HOLOTYPE PC) 1045 à 1048 ; cited in Montagne 1854 (sub nom. *Marasmius*) ; Dennis 1951:474 (sub nom. *Dictyoploca*)

****Collybia polygramma*** (Montagne)Dennis

-Leprieur 1039 (HOLOTYPE PC) ; cited in Montagne (sub nom. *Marasmius*) ; Dennis 1951:447 ; Pegler 1983a:162

Collybia syringea Singer

-*Rossman A.Y. & C.Feuillet* 3358 [Pegler D.N. 1988] : Macouria - Piste de Saut Leodate.

Crinipellis Patouillard

Crinipellis eggersii Patouillard

-*Courtecuisse R.* RC/GF88.442 [Courtecuisse R. 1989] : Saut Pararé ; Arataye River - Approuague basin.

Crinipellis septotricha Singer *(fo.)*

-*Courtecuisse R.* RC/GF88.616 [Courtecuisse R. 1989] : Saut Pararé ; Arataye River - Approuague basin.

****Crinipellis urbica*** (Montagne ®)Dennis

-Leprieur 989 (HOLOTYPE PC) ; cited in Montagne 1854 ; Singer 1976:15

Filoboletus P. Hennings

Filoboletus gracilis (Klotzsch in Berkeley)Singer

-*Courtecuisse R.* RC/GF88.101 [Courtecuisse R. 1988] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.181 [Courtecuisse R. 1988] : Saut Pararé ; Arataye River - same area. -*Jacquemin H.* 2655 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2711 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2720 : Mont Cabassou - Cayenne. -*Rossman A.Y. & Feuillet C.* 3291 [Pegler D.N. 1988] : Route de Belizon - Track to Montagne Tortue.

Hydropus (Kühner)ex Singer

Hydropus bisporus Singer

-*Courtecuisse R.* RC/GF88.163 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin.

Hydropus nigritus (Berkeley & Curtis)Singer

-*Rossman A.Y.* 3338 [Pegler D.N. 1988] : Rémiré - 15 km from Cayenne ; trail to Vidal old farm. -*Rossman A.Y.* 3339 [Pegler D.N. 1988] : Rémiré - 15 km from Cayenne ; trail to Vidal old farm.

Hydropus terrae-firmae Singer

-*Courtecuisse R.* RC/GF88.271 [Courtecuisse R. 1991] : Saut Pararé ; Arataye River - Approuague basin.

Lactocollybia Singer

****Lactocollybia holophaea*** (Montagne)Singer

-Leprieur 987 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Marasmius*), Singer 1970:63 (sub nom. *Marasmius*) ; Pegler 1983a:96

Lentinula Earle

*__*Lentinula boryana*__ (Berkeley & Montagne)Pegler

-Leprieur 980, 981 (HOLOTYPE PC *Panus leprieuri*) ; cited in Montagne 1854 (sub nom. *Panus leprieuri*)

-Leprieur 982 ; cited in Montagne 1854 (sub nom. *Agaricus ixodes*) ; Pegler 1983a:158 ; Pegler 1983b:242 (sub nom. *Lentinus ixodes*), 243 (sub nom. *Lentinus leprieuri*)

Marasmiellus Murrill

__*Marasmiellus defibulatus*__ Singer

-*Courtecuisse R.* RC/GF88.027 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin.

__*Marasmiellus incrustatus*__ Singer

-*Courtecuisse R.* RC/GF88.050 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin.

__*Marasmiellus nigripes*__ (Schweinitz ® Fries)Singer

-*Courtecuisse R.* RC/GF88.008 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.138 [Courtecuisse R. 1990] : same loc. -*Courtecuisse R.* RC/GF88.187 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - same area. -*Courtecuisse R.* RC/GF88.296 [Courtecuisse R. 1990] : same loc.

*__*Marasmiellus rubellus*__ (Montagne)Singer

-Leprieur 993 ; cited in Montagne 1854 (sub nom. *Marasmius*) ; Singer 1973:138

*__*Marasmiellus sp.*__

-Leprieur 1061 ; cited in Montagne 1854 (sub nom. *Panus rubicundus*) ; Pegler 1983b:255

__*Marasmiellus stenophylloides*__ (Dennis)Dennis

-*Courtecuisse R.* RC/GF88.173 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

*__*Marasmiellus stenophyllus*__ (Montagne)Singer

-Leprieur 1012 ; cited in Montagne 1854 (sub nom. *Agaricus*)

-Leprieur 1029 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Marasmius*) ; Singer 1973:37 ; Pegler 1983a:150 (sub nom. *Marasmius*)

__*Marasmiellus troyanus*__ (Murrill)Dennis *fo.*

-*Courtecuisse R.* RC/GF88.002 [Courtecuisse R. 1991] : Cayenne - Quartier Chaton.

__*Marasmiellus volvatus*__ Singer

-*Courtecuisse R.* RC/GF88.094 [Courtecuisse R. 1991] : Camp des Nouragues ; Arataye River - Approuague basin.

Marasmius Haller

*__*Marasmius actinopus*__ Montagne

-Leprieur without n° (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1951:425, Singer 1976:241

__*Marasmius atrorubens*__ (Berkeley)Berkeley

-*Courtecuisse R.* RC/GF88.053 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.170 [Courtecuisse R. 1990] : same loc.

Marasmius cladophyllus Berkeley

-*Courtecuisse R.* RC/GF88.135 [Courtecuisse R. 1990] : Camp des nouragues ; Arataye River - Approuague basin.

Marasmius ferrugineus (Berkeley®)Berkeley & Curtis

-Leprieur 1025 ; cited in Montagne 1854

Marasmius fulviceps Berkeley

-Leprieur 1079 ; cited in Montagne 1854

Marasmius griseoroseus (Montagne)Dennis

-Leprieur 1018 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Agaricus*) ; Singer 1976:256 ; Pegler 1983a:230

Marasmius guianensis Montagne

-Leprieur 995 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1951:417 ; Singer 1976:146 ; Pegler 1983a:204

Marasmius haedinus Berkeley

  var. minor Dennis

-*Jacquemin H.* 2679 : Route de Belizon - R.N. 2.

Marasmius haematocephalus (Montagne)Fries

-*Courtecuisse R.* RC/GF88.009 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

Marasmius helvolus Berkeley

-*Courtecuisse R.* RC/GF88.052 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin.

Marasmius leoninus Berkeley

-*Rossman A.Y.* 4030 [Pegler D.N. 1987] : ?

Marasmius montagneanus Singer

-Leprieur 990, 1023 ; cited in Montagne 1854 (sub nom. *Marasmius haematocephalus*) ; Singer 1976:219

Marasmius niveus Montagne

-Leprieur 1038 (HOLOTYPE PC) ; cited in Montagne 1854 ; Dennis 1951:434 ; Singer 1976:276 ; Pegler 1983a:211

Marasmius pallescens Murrill

-*Rossman A.Y. & Feuillet C.* 3234 [Pegler D.N. 1988] : Route de Belizon - Track to Montagne Tortue.

Marasmius poecilus Berkeley

-*Rossman A.Y.* 3342 [Pegler D.N. 1988] : Rémiré - 15 km from Cayenne ; trail to Vidal old farm.

Marasmius polycladus Montagne

-Leprieur without n° (HOLOTYPE PC) ; cited in Montagne 1854 ; Singer 1976:135

Marasmius proletarius Berkeley & Curtis

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3081 [Pegler D.N. 1987] : Route de Paul Isnard - Paul Isnard area.

Marasmius pusio Berkeley & Curtis

-*Rossman A.Y. & Feuillet C.* 3152[Pegler D.N. 1988] : Montagne Cacao, Piste Coralie - 70 km E from Cayenne.

Marasmius radicellicola Singer

-*Courtecuisse R.* RC/GF88.401 [Courtecuisse R. 1992] : Saut Pararé ; Arataye River - Approuague basin.

Marasmius rhabarbarinus Berkeley
-*Rossman A.Y. & Feuillet C.* 3367 [Pegler D.N. 1988] : Montagne de Kaw.

*****Marasmius rubricosus*** Montagne
-Leprieur 1924 p.p. (HOLOTYPE PC) ; cited in Montagne 1854 ; Singer 1976:170 (type not found).

Marasmius rufescens Berkeley & Broome
-*Rossman A.Y., Feuillet C. & Skog L.E.*2891 [Pegler D.N. 1987 s.n.*M.tenuissimus*] : Crique Cochon - Saül area.

Marasmius splitbergeri (Montagne)Singer
-*Courtecuisse R.* RC/GF88.006 [Courtecuisse R. 1990] : Camp des Nouragues ; Arataye River - Approuague basin.

Marasmius tageticolor Berkeley
-*Rossman A.Y. & Feuillet C.* 3149 [Pegler D.N. 1988] : Montagne Cacao - Piste Coralie, 70 km E of Cayenne.

Mycena Persoon

*****Mycena tesselata*** (Montagne)Dennis
-Leprieur 1044 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Marasmius*) ; Dennis 1951:474 (sub nom. *Dictyoploca*) ; Pegler 1983a:261

Mycena trichocephala Singer
-*Courtecuisse R.* RC/GF88.133 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

Physalacria Peck

Physalacria sp.
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2809 [Seifert K.A.] : Macouria, road from Tonate to Montsinéry.

Trogia Fries

*****Trogia buccinalis*** (Montagne)Patouillard
-Leprieur 1063 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Cantharellus*) ; Corner 1966:200 ; Pegler 1983a:157

Trogia cantharelloides (Montagne)Patouillard
-Leprieur 1041 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Panus*).
-*Rossman A.Y.& Feuillet C.* 3220 [Pegler D.N. 1988] : Rémiré - Trail to Vidal old farm, 15 km from Cayenne. -*Rossman A.Y.* 3357 [Pegler D.N. 1988] : Rémiré - 15 km from Cayenne ; trail to Vidal old farm.

Xeromphalina Kühner & Maire

Xeromphalina tenuipes (Schweinitz)A.H. Smith
-*Rossman A.Y., Feuillet C. & Skog L.E.* 2985 [Pegler D.N. 1987] : Montagne La Fumée - Saül area.

PLEUROTACEAE

Lentinus Fries

Lentinus bertieri (Fries : Fries)Fries
-*Courtecuisse R.* RC/GF88.076 [Courtecuisse R. 1991] : Camp des Nouragues ; Arataye River - Approuague basin. -*Jacquemin H.* 2406 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2766 : Piste de Saint-Elie.

Lentinus concavus (Berkeley)P. Hennings

-*Rossman A.Y., Feuillet C. & Skog L.E.* 3023 [Pegler D.N. 1987] : Layon Galbao - Saül area.

Lentinus crinitus (Linnaeus : Fries)Fries

-*Jacquemin H.* 2168 : Ile d' Antecume Pata - Litani River basin.

****Lentinus fasciatus*** Berkeley

-cited in Pilat 1936:125 (sub nom. *Lentinus tigrinus var.holopogonius* = *L.pergamenus* Lév. in herb.Berlin-Dahlem) : Cayenne.

Lentinus striatulus Léveillé

-*Courtecuisse R.* RC/GF88.106 [Courtecuisse R. 1991] : Camp des Nouragues ; Arataye River - Approuague basin.

****Lentinus strigosus*** (Schweinitz)Fries

-Leprieur 853bis ; cited in Montagne 1854 ; Pegler 1983a:35 ; Pegler 1983b:125

Lentinus swartzii Berkeley

-*Jacquemin H.* 2064 : Piste de Saint-Elie.

****Lentinus tephroleucus*** Montagne

-Leprieur 974 (HOLOTYPE PC *L.leprieuri*) ; cited in Montagne 1854 (sub nom. *L.leprieuri*) ; Pegler 1977:30 (sub nom. *L.leprieuri*) ; Pegler 1983a:32 (sub nom. *L.leprieuri*) ; Pegler 1983b:154

****Lentinus velutinus*** Fries

-Leprieur without n° ; cited in Montagne 1854 ; Pegler 1983b:149

-Leprieur 975, 976 ; cited in Montagne 1854 (sub nom. *L.zonatus*)

Nothopanus Singer

Nothopanus hygrophanus (Montagne)Pegler

-Leprieur 1106 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Panus*).

-*Courtecuisse R.* RC/GF88.183 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - Approuague basin.

Pleurotus (Fries) Quélet

Pleurotus djamor (Rumphrey : Fries)Boedijn

-*Courtecuisse R.* RC/GF88.123 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.643 [Courtecuisse R. 1990] : Saut Pararé ; Arataye River - same area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2872 [Pegler D.N. 1987] : Crique Cochon et Plateau La Douane - Saül area. -*Rossman A.Y. & Feuillet C.* 3300 [Pegler D.N. 1988] : Piste de Saut Leodate. -*Rossman A.Y.* 4034 [Pegler D.N. 1987] : Piste Balaté - 12 km from Saint-Laurent-du-Maroni.

Pleurotus ostreatus (Jacquin : Fries)Kummer

-*Jacquemin H.* 2779 : Commune de Saül - Saül area.

PLUTEACEAE

Chamaeota (W.G. Smith)Earle

Chamaeota subolivascens Courtecuisse

-*Courtecuisse R.* RC/GF88.428 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

Pluteus Fries

Pluteus aethalus (Berkeley & Curtis)Saccardo

-*Courtecuisse R.* RC/GF88.374 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.445 [Courtecuisse R. 1991] : same loc.

Pluteus albostipitatus (Dennis)Singer ex Singer

-*Courtecuisse R.* RC/GF88.547 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin.

Pluteus fluminensis Singer

-*Courtecuisse R.* RC/GF88.300 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin.

Pluteus sapiicola Singer

-*Courtecuisse R.* RC/GF88.158 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.220 [Courtecuisse R. 1991] : same loc. -*Courtecuisse R.* RC/GF88.615 [Courtecuisse R. 1991] : same loc.

Pluteus sergii Singer

-*Courtecuisse R.* RC/GF88.427 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin.

Volvariella Spegazzini

Volvariella minutella Courtecuisse

-*Courtecuisse R.* RC/GF88.289 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

Volvariella perciliata Courtecuisse

-*Courtecuisse R.* RC/GF88.360 [Courtecuisse R. 1991] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

RUSSULACEAE

Lactarius De Candolle

Lactarius epitheliosus Buyck & Courtecuisse

-*Courtecuisse R.* RC/GF88.217 [Buyck B. 1991] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

Russula Persoon

Russula hygrophytica Pegler

-*Courtecuisse R.* RC/GF88.618 [Buyck B. 1991] : Saut Pararé ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.650 [Buyck B. 1991] : same loc.

Russula moyersoni Buyck

var. brunnea Buyck & Courtecuisse

-*Courtecuisse R.* RC/GF88.160 [Buyck B. 1991] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

Russula violaceotunicata Buyck & Courtecuisse

-*Courtecuisse R.* RC/GF88.539 [Buyck B. 1991] : Station de l'Arataye ; Arataye River - Approuague basin (HOLOTYPE PC).

STROPHARIACEAE

Psilocybe (Fries)Kummer

Psilocybe coprophila (Bull.:Fries)Kummer

-*Rossman A.Y., Feuillet C. & Skog L.E.* 4031 [Pegler D.N. 1987] : Road to Javouhey - Saint-Laurent-du-Maroni.

Psilocybe cubensis (Earle)Singer

-*Jacquemin H.* 2229 : Savane Matiti - Coastal area.

TRICHOLOMATACEAE

Asterotus Singer

*****Asterotus dealbatus*** (Berkeley)Singer

-Leprieur 957 (sub nom. *Panus bicolor*) ; see Thorn & Barron, 1986:379 ; Pegler, 1983b:223

Gerronema R. Singer

Gerronema cyathiforme (Berkeley & Curtis)Singer

-*Jacquemin H.* 2000 : Trois-Sauts ; Wayampi village - Oyapock River high basin.

Gerronema tenue Dennis

-*Rossman A.Y.& Feuillet C.* 3253 [Pegler D.N. 1988] : Route de Belizon - Track to Montagne Tortue.

Hohenbuehelia Schulzer

Hohenbuehelia paragayensis (Spegazzini)Singer

-*Courtecuisse R.* RC/GF88.026 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.115 [Courtecuisse R. 1989] : same loc.

Panellus P.Karsten

Panellus pusillus (Persoon) Burdsall & O.K. Miller

-*Courtecuisse R.* RC/GF88.023 [Courtecuisse R. 1988] : Camp des Nouragues ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.563 [Courtecuisse R. 1988] : Saut Pararé ; Arataye River - same area.

Tricholoma (Fries)Quélet

Tricholoma crassum (Berkeley)Saccardo

-*Jacquemin H.* 2259 : Route Nationale RN 2. -*Jacquemin H.* 2260 : Route Nationale RN2.

Tricholomopsis Singer

Tricholomopsis atrogrisea Pegler

-*Rossman A.Y., Feuillet C. & Skog L.E.* 2981 [Pegler D.N. 1987] : Mont La Fumée - Saül area.

D2c - ***Gasteromycetideae***

CLATHRACEAE

Clathrus Micheli ex Persoon : Persoon

*****Clathrus crispus*** Turpin

-Leprieur 1086 ; cited in Montagne 1854

GEASTRACEAE

Geastrum Persoon

Geastrum lageniforme Vittadini

-*Courtecuisse R.* RC/GF88.155 [Courtecuisse R. 1989] : Camp des Nouragues ; Arataye River - Approuague basin.

*****Geastrum mirabile*** Montagne

-Leprieur 843 (HOLOTYPE PC) ; cited in Montagne 1854 (type)

Geastrum saccatum (Fries)Ed. Fischer

-*Jacquemin H.* 2041 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2041 bis : same loc.

Geastrum velutinum Morgan

-*Courtecuisse R.* RC/GF88.463 [Mornand J. 1992] : Saut Pararé ; Arataye River - Approuague basin. -*Courtecuisse R.* RC/GF88.519 [Mornand J. 1992] : same loc.

LYCOPERDACEAE

Disciseda Czern.

****Disciseda cervina*** (Berkeley)Hollos

-Leprieur 878 ; cited in Montagne 1854 (sub nom. *Bovista*)

Lycogalopsis Ed.Fischer

Lycogalopsis solmsii Ed. Fischer

-*Courtecuisse R.* RC/GF88.203 [Mornand J. 1992] : Saut Pararé ; Arataye River - Approuague basin.

Lycoperdon Tournefort : Persoon

Lycoperdon fuligineum Berkeley & Broome

-*Courtecuisse R.* RC/GF88.464 [Mornand J. 1992] : Saut Pararé ; Arataye River - Approuague basin.

NIDULARIACEAE

Cyathus Haller : Persoon

Cyathus helenae Brodie

-*Courtecuisse R.* RC/GF88.344 [Mornand J. 1992] : Saut Pararé ; Arataye River - Approuague basin.

Cyathus limbatus Tulasne

-*Jacquemin H.* 2005 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2268 : Mont Cabassou - Cayenne. -*Jacquemin H.* 2458 : Saut Maïs - Saül area.

Cyathus plicatus Fries

-*Samuels G.J. & Searwar P.* 4359 [Samuels G.J. & Searwar P. 1990] : Lieu-Dit Citron - Paul Isnard area.

PHALLACEAE

Dictyophora Desvaux

****Dictyophora indusiata*** (Ventenat : Persoon) E.Fischer

-Leprieur 838 ; cited in Montagne 1854 (sub nom. *Phallus radicatus*)

-Leprieur 839 ; cited in Montagne 1854 (sub nom. *Phallus indusiatus*)

Staheliomyces Ed. Fischer

Staheliomyces cinctus Ed. Fischer

-*Jacquemin H.* 2034 : Trois-Sauts ; Wayampi village - Oyapock River high basin. -*Jacquemin H.* 2701 : Mont Cabassou - Cayenne. -*Samuels G.J.* 3418 [Samuels G.J. 1986] : Montagne La Fumée - Saül area. -*Samuels G.J. & Boise J.R.* 2694a [Samuels G.J. 1986] : Commune de Saül - Saül area.

Xylophallus (Schlecht.)Ed.Fischer

****Xylophallus xylogenus*** (Montagne)Schlecht.

-Leprieur 840 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Phallus*) ; Dennis 1970:5

SCLERODERMATACEAE

Scleroderma Persoon : Persoon

Scleroderma sinnamariense Montagne
-Leprieur 386 (HOLOTYPE PC) ; cited in Montagne 1854

INCERTAE SEDIS

Aecidium Persoon (*Basidiomycotina* ; Uredinales)

Aecidium cordiae P.Hennings
-*Broadway W.E.* BPI 906.

Karschia Körber (*Ascomycotina* ; Dothideales)

Karschia sp.
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3077 : Saint-Laurent-du-Maroni - Piste Paul Isnard.

Karschia sp.
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3089 : Saint-Laurent-du-Maroni - Piste Paul Isnard.

Karschia sp.
-*Rossman A.Y., Feuillet C. & Skog L.E.* 3090 [Haines J.H.] : Saint-Laurent-du-Maroni - Piste Paul Isnard.

Laboulbeniopsis Thaxter (*Ascomycotina*)

*****Laboulbeniopsis termitarius*** Thaxter
-cited in Blackwell & Ross, 1986:588

Macrovalsaria Petrak (*Ascomycotina* ; Dothideales)

*****Macrovalsaria megalospora*** (Montagne)Sivanesan
-Leprieur 239, 240 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Sphaeria*) ; Sivanesan, 1975:401

Mycosyrinx Beck (*Basidiomycotina* ; Ustilaginales)

Mycosyrinx cissi Beck
-*Broadway W.E.* 164 : Cayenne.

Rhizomorpha Roth ex Fries (?)

Rhizomorpha corynephora (Roth ex Fries)O.Kunze
-*Billiet F. & Jadin B.* 1948 : Lieu-Dit Citron - Paul Isnard area. -*Jacquemin H.* 2786 : Commune de Saül - Saül area. -*Rossman A.Y., Feuillet C. & Skog L.E.* 2899 : Crique Cochon & Plateau La Douane - Saül area.

Rhodoarrhenia R. Singer (*Basidiomycotina*)

Rhodoarrhenia pensilis (Berkeley & Curtis)Pegler
-*Jacquemin H.* 1959 : Route Nationale RN 2. -*Jacquemin H.* 2184 : Colline de Bourda - Cayenne.

Triblidium Rebentisch (*Ascomycotina*, *Triblidiaceae*)

*****Triblidium cruentatum*** (Montagne)Sherwood
-Leprieur 805 (HOLOTYPE PC) ; cited in Montagne 1854 (sub nom. *Stictis*) ; Sherwood 1977:169

Uredo Persoon (*Basidiomycotina* ; Uredinales)

Uredo scleriae DeCandolle
-? : Cayenne.

DOUBTFUL

The following list gathers the species with present uncertain taxonomical identity, collections not yet revised and questionnable, old citations from litterature for doubtful species to be hopefully collected again, species probably present in French Guiana but with reference not found so far.

The doubtful taxa from Montagne 1854 are given with the Leprieur herbarium number into brackets. Other herbarium or litterature indications are eventually added.

Agaricus (*Mycena*) *alborubellus* Montagne (1006) (combined under *Pluteus* by Patouillard, but according to Singer, 1965, does not belong in that genus) ; *A.campestris* L.:Fries (752) ; *A.collecticus* Montagne (1034) ; *A.*(*Psathyra*) *cubosporus* Montagne (1084) ; *A.*(*Psathyrella*) *cultriger* Montagne (1001, 1015) ; *A.*(*Psathyrella*) *fulvipes* Montagne (1035) ; *A.*(*Psathyra*) *gastrodes* Montagne (1005) ; *A.*(*Omphalia*) *griseolutescens* Monta-gne (1040) ; *A.*(*Collybia*) *griseorubens* Montagne (970, 1008) ; *A.*(*Mycena*) *haematochrous* Montagne (968) ; *A.hortensis* Montagne (1011) ; *A.*(*Psathyrella*) *hortulanus* Montagne (1008, 1014) ; *A.*(*Mycena*) *leptopilus* Montagne (1017) ; *A.mirabilis* Montagne (1059) ; *A.*(*Psathyra*) *oenochrous* Montagne (1083) ; *A.*(*Lepiota*) *pilosiuscula* Montagne (1028) ; *A.*(*Psathyra*) *sequatorius* Montagne (979) ; *A.*(*Omphalia*) *spodoides* Montagne (1033, 1052).
Agrocybe pediades (1030 s.n. *Agaricus* (*Naucoria*) *alboluteus*) (see Watling & Gregory, 1981:47) ; *A.praecox* (998 s.n. *Agaricus*).
Antennaria tropica Montagne (687).
Ascospora phomatoides Montagne (440).
Asterina labecula Montagne (664).
Auricularia auricula-judae (Bull.)Wettstein (without n°) ; *A.mesenterica* (1051).
Calocera cornea (1076) ; *C.delicata* Fries (without n°) ; *C.glossoides* Fries (906).
Cenangium aequinoctiale Montagne (1343).
Cheilaria melanoplaca Montagne (1125, 1126).
Clavaria brasiliensis Léveillé (904, 1413) ; *C.nivea* L.C.M.Richard.
Clavulina amethystea (892, s.n. *Clavaria*) ; *C.cristata* (893, s.n. *Clavaria*).
Clavulinopsis corniculata (902, s.n. *Clavaria fastigiata*).
Coltricia perennis (1064, s.n. *Polyporus*).
Conocybe umbellula (Montagne)Singer 1955 (978, s.n. *Agaricus* (*Galera*) *umbellula* Montagne ; see Watling & Gregory, 1981).
Cordyceps strangulans Montagne (1146) (or "*strangulatus*").
Coriolopsis sprucei (Berk.)Roy & Mitra ?
Coriolus velutinus Berkeley & Curtis (Jacquemin H., 2447).
Corticium caulium Berk. & Curt. (963).

Craterellus cornucopioides (1077).
Diatrype erinaea Montagne (396) ; *D.radicalis* (Sch.)Fries (392) ; *D.stellulata* Fries (1172).
Dothidea acrocomiae Montagne (1156) ; *D.phylloplacus* Montagne (1152).
Enslinia leprieuri Montagne (887).
Ganoderma resinaceum Boudier ?
Geastrum scleroderma Montagne (1089).
Graphiola phoenicis Poiteau (664).
Hendersonia heliconia Montagne (1123).
Hexagona aculeata Montagne (without n°) ; *H.aculeata fo.glabrata* ? (coll. W.E. Broadway, Cayenne ; Det.G.Bresadola in herb.Bresadola, J.R.Weir 21800, Farlow 862) ; *H.papyracea* Berkeley ?
Hiatula lignifraga Montagne (985).
Hirneola lancicula Montagne (1087).
Hygrocybe conica (Scop.:Fries) (1082, s.n. *Hygrophorus*).
Hygrophorus maroniensis Heim (Heim, 1967).
Hypochnus nigrocinctus Ehr. (248).
Hypocrea phyllogena Montagne (588, 1121) ; *H.rufa* Fries (881, 882).
Hypocreopsis xylariicola Samuels.
Hypolyssus montagnei Berk. (without n°).
Hypoxylon anthracodes Fries (222, 379, 1187) ; *H.arecarium* Bory (432) ; *H.asphaltum* Link (436, 1183) ; *H.coenopus* Fries (387, 400, 425, 430, 1164) ; *H.comaropsis* Montagne (368) ; *H.endoxanthum* Montagne (1171) = *Xylaria* sp. ; *H.exsurgens* Montagne (1181), see Rogers & al, 1994:689 ; *H.incrustans* Montagne (1137, 1138) ; *H.macromphalum* Montagne (1168) ; *H.macrospermum* Montagne (255) ; *H. microstictum* Montagne (293) ; *H. phoenix* Kunze (1175) ; *H.porosum* Montagne (1177).
Hysterium foliicolum Fries (1373).
Lemalis mangiferae Montagne (389).
Lembosia catervaria Montagne (1132, 1154).
Leocarpus melaleucus Montagne (880).
Lepiota clypeolaria (without n°, s.n. *Agaricus*).
Leucoagaricus cepaestipes (1054, s.n. *Agaricus*).
Lysurus cruciatus (Leprieur & Montagne)Ed.Fischer ?
Marasmius (*Collybia*) *congregatus* Montagne (1081) ; *M.*(*Collybia*) *decurrens* Montagne (984) ; *M.*(*Collybia*) *dispar* Montagne (991) (illeg.: non Batsch) ; *M.*(*Collybia*) *gamophyllus* Montagne (997) ; *M.*(*Collybia*) *rugatus* Montagne (969).
Micropeltis applanata Montagne ? ; *M.marginata* Montagne (1134).
Midotis heteromera Montagne (534).
Mycena pura (1031, s.n. *Agaricus*).
Naematelia granulosa (1088).
Nectria coccinea (Persoon:Fries)Fries (1170) ; *N.episphaeria* (Tode:Fries)Fries (255) ; *N. sanguinea* Sibthorp (582).
**Neotyphula guianensis* Wakefield ?
Panaeolus papilionaceus (1058).
Pemphidium nitidum Montagne (391).
Peziza applanata Hedw. (without n°) ; *P.hindsii* Berk. (without n°).

Phacidium phomatoides Montagne (440) (see DiCosmo & al.).
Phanerochaete crassa (Léveillé)Burdsall ?
Polyporus (*Lenti*) *agariceus* Berk. (952) ; *P.extensus* Berk.in herb. (Herb.Montagne ; Cayenne) ; *P.fibrosoradiatus* Montagne (Bres. herb.) ; *P.*(*Petaloides*) *grammocephalus var.cayennensis* Montagne (without n°) ; *P.*(*Dichroi*) *gilvus var. scabrorugosus* Berk. (961) ; *P.*(*Impoliti*) *nitidus var.croceus* (142) ; *P.*(*Impoliti*) *tristiusculus* Montagne (without n°).
Poronia heliscus Montagne (252).
Pyronema omphalodes (Bull.)Fuckel (888, s.n.*Peziza*).
Ramaria formosa (896, s.n.*Clavaria*).
Resupinatus striatulus (983, s.n. *Agaricus*).
Rhytisma astrocaryi Montagne (1120, 1147) ; *R.gyrosum* Montagne (1143, 1148) ; *R. myrciae* Montagne (1140).
Rosellinia mammiformis (Persoon:Fries)Cesati & DeNotaris (without n°, s.n.*Sphaeria*).
Sacidium mauritiae Montagne (1140).
Sphaeria clivulosa Montagne (without n°) ; *S.fusariispora* Montagne (1122) ; *S.nitidula* Montagne (1118, 1127) ; *S.oedema* Montagne (346) ; *S.pseudobombarda* Montagne (370) ; *S.rhaphidosperma* Montagne (375) ; *S.schizostoma* Montagne (without n°) ; *S.sulcigena* Montagne (without n°) ; *S.trichodes* Montagne (581) ; *S. uberina* Montagne (without n°).
Sphaeropsis paradisiaca Montagne (1124).
Stictis microsticta (1131) (see Sherwood 1977) ; *S.variolosa* Montagne (1336) (see Sherwood 1977).
Thamnomyces rostratus Montagne (without n°).
Thelephora nigella Montagne (without n°) ; *T.liliputiana* Montagne (658).
Trametes beyrichii Fries (931).
Xylaria apeibae Montagne (1207) ; *X.collabens* Montagne (407, 409) ; *X.columnifera* Montagne (1125, 1127) ; *X.globosa* Spreng. (227, 228) ; *X.gomphus* Fries (1215) ; *X.hyperythra* Montagne (414 p.p., 1201) ; *X.myosurus* Montagne (1412) ; *X. rhizomorpha* Montagne (234) ; *X.ruginosa* Montagne (without n°).

INDEX OF GENERIC NAMES:

Acanthonitschkia Spegazzini 32
Acrodictys M.B.Ellis 7
Acrostroma Seifert 7
Aecidium Persoon 66
Agaricus L.:Fries 67
Agrocybe Fayod 54, 67
Aleuria (Fries) Fuckel 42
Amauroderma Murrill 47
Amphisphaeria Cesati & deNotaris 16
Angelina Fries 40
Antennaria Link 67
Aphelaria Corner 46
Apiocamarops Samuels & Rogers 17
Aquascypha Reid 49
Arachnocrea Moravec 18
Arcyria Wiggers 6
Arthridium Kunze 7
Ascospora Fries 67
Asterina Léveillé 67
Asterotus Singer 64
Astrocystis Berkeley & Broome 35
Astrosphaeriella H. Sydow & Sydow 13
Athelia Persoon 46
Auerswaldia Saccardo 9
Auricularia Bulliard 44, 67
Batistia Ciferri 16

Berlesiella Saccardo 10
Bertia De Notaris 32
Bisporella Saccardo 41
Boletinus Kalchbrenner 55
Botryosphaeria Cesati & De Notaris 9
Byssosphaeria M.C. Cooke 11
Calocera (Fries : Fries) Fries 44, 67
Calonectria De Notaris 18
Calosphaeria L.R. & C. Tulasne 17
Calyculosphaeria Fitzpatrick 33
Camarops P.Karsten 17
Camillea Fries 35
Cantharellus Adanson : Fries 46
Capronia Saccardo 10
Caripia O.Kuntze 46
Cenangium Fries 67
Ceratiomyxa Schroeter 3
Ceriporia Donk 50
Chaetocalathus Singer 57
Chaetopsina Rambelli 7
Chaetospermum Saccardo 7
Chaetosphaerella Müller & Booth 34
Chaetosphaeria L.R. & C.Tulasne 34
Chamaeota (W.G. Smith) Earle 62
Cheilaria 67
Chlorophyllum Massee 54
Clathrus Micheli ex Persoon : Persoon 64
Clavaria Fries : Fries 46, 67
Clavulina Schroeter 67
Clavulinopsis Van Overeem 67
Coccoidella Von Höhnel 10
Coccomyces De Notaris 42
Collybia (Fries : Fries)Staude 59
Coltricia S.F.Gray 48, 67
Comatricha Preuss 5
Conocybe Fayod 54, 67
Cookeina O.Kuntze 43
Coprinus (Persoon) S.F. Gray 5
Cordierites Montagne 41
Cordyceps (Fries) Link 17, 67
Coriolopsis Murrill 50, 67
Coriolus Quélet 67
Corticium Fries 67
Cotylidia P.Karsten 49
Craterellus Fries 68
Craterium Trent. 4
Cribraria Persoon 3
Crinipellis Patouillard 58
Cyathus Haller : Persoon 65
Cyclomyces Fries 48
Cylindrocarpon 7
Cymatoderma Junghuhn 50
Cytosphaera Diedicke 7
Dacryopinax Martin 44
Daedalea Persoon : Fries 50
Daldinia Cesati & De Notaris 36
Datronia Donk 50
Dennisiomyces Singer 56
Diaporthe Nitschke 18
Diatrype Fries 18, 68
Diatrypella (Ces. & De Not.) De Notaris 18
Dictymium Schrader 4
Dictyophora Desvaux 65
Didymium Schrader 4
Disciseda Czern. 65
Ditiola Fries : Fries 44
Dothidea Fries 68
Dysrynchis Clements 13
Earliella Murrill 50
Echinochaete Reid 50
Encoelia (Fr.:Fr.)P.Karsten 41
Endocreas Samuels & Rogerson 18
Enslinia 68
Entoloma (Fries) Kummer 56
Favolaschia (Patouillard) Patouillard 47
Favolus Beauvais 50
Filoboletus P.Hennings 58
Fistulinella P.Hennings 55
Fluviostroma Samuels & Müller 35
Fomes (Fries)Fries 50
Fuligo Haller 4
Fusarium Link 7
Gaillardiella Patouillard 33
Galerina Earle 55
Ganoderma P.Karsten 47, 68
Geastrum Persoon 64, 68
Gerronema Singer 64
Gibberella Saccardo 18
Gibellula Cavara 7
Gliocladium Corda 7
Gloeocantharellus Singer 48
Gloeophyllum (P.Karsten) P.Karsten 51
Glonium Mühlenberg : Fries 10
Gomphus Persoon 48
Graphiola 68
Haddowia Steyaert 48

Hapalopilus P.Karsten 46
Harpographium Saccardo 7
Hemitrichia Rostafinski 6
Hendersonia 68
Herpotrichia Fuckel 11
Heterochaete Patouillard 45
Heterochaetella (Bourd.)Bourd. & Galz. 45
Hexagonia Pollini 51, 68
Hiatula (Fries)Montagne 68
Hirneola Fries 68
Hohenbuehelia Schulzer 64
Hydnodon Banker 54
Hydnopolyporus Reid 51
Hydropus (Kühner) ex Singer 58
Hygroaster Singer 56
Hygrocybe (Fries)Kummer 56, 68
Hygrophorus Fries 68
Hymenochaete Léveillé 48
Hymenostilbe Petch 8
Hypochnus Fries:Fries 68
Hypocrea Fries 18, 68
Hypocrella Saccardo 17
Hypocreopsis P.Karsten 68
Hypolyssus 68
Hypomyces (Fries)Tulasne 19
Hypoxylon Bulliard : Fries 36, 68
Hysterium Tode : Fries 68
Hysterographium Corda emend. deNotaris 1
Immotthia Barr 10
Inonotus P.Karsten 48
Iodosphaeria Samuels, Müller & Petrini 16
Javaria Boise 14
Karschia Körber 66
Kretzschmaria Fries 37
Laboulbeniopsis Thaxter 66
Lachnocladium Léveillé 49
Lachnum Retz. 41
Lactarius De Candolle 63
Lactocollybia Singer 58
Lambertella Von Höhnel 42
Lanzia Saccardo 42
Lasiodiplodia Ellis & Everhart 8
Lasiosphaeria Cesati & De Notaris 31
Lasiosphaeriella Sivanesan 31
Lemalis Fries 68
Lembosia Léveillé 68
Lentaria Corner 49
Lentinula Earle 59
Lentinus Fries 61
Leocarpus 68
Lepiota (Persoon)S.F. Gray 68
Leprieuria Laessoe, Rogers & Whalley 37
Leucocoprinus Patouillard 54, 68
Linocarpon Sydow 31
Lopharia (see *Porostereum*)
Lophiostoma Cesati & deNotaris 11
Lycogala Adanson 5
Lycogalopsis Ed. Fischer 65
Lycoperdon Tournefort : Persoon 65
Lysurus Fries 68
Macrovalsaria Petrak 66
Marasmiellus Murrill 59
Marasmius Haller 59, 68
Massarina Saccardo 11
Melanochaeta Müller, Harr & Sulmont 32
Melanographium Saccardo 8
Melioliphila Spegazzini 14
Microglossum Gillet 41
Micropeltis Montagne 68
Microporellus Murrill 51
Midotis Fries 68
Mycena Persoon 61, 68
Mycopepon Boise 12
Mycosyrinx Beck 66
Myrothecium Tode 8
Naematelia Fries : Fries 68
Nectria (Fries) Fries 19, 68
Nectriopsis Maire 30
Neohypodiscus Rogers, Ju & Laessoe 38
Neotyphula Wakefield 68
Niesslia Auerswald 32
Nitschkia Otth ex P. Karsten 33
Nodulisporium Preuss 8
Nothopanus Singer 62
Ophionectria Saccardo 30
Ophiosphaerella Spegazzini 13
Ophiostoma H. & P. Sydow 34
Orbilia Fries 42
Ostropella (Saccardo)von Höhnel 12
Oudemansiella Spegazzini 56
Oxyporus (Bourdot & Galzin)Donk 51
Panaeolus (Fries)Quélet 55, 68
Panellus P.Karsten 64
Pemphidium Montagne 68
Penicillifer Van Emden 8
Penicillium Link 8

Penzigia Saccardo 38
Perenniporia Murrill 51
Peristomialis (Phillips)Boudier 31
Pestalotia De Notaris 8
Peziza Bull.:Fries 68
Phacidium Fries 69
Phaeoschizophyllum W. B.Cooke 54
Phaeosphaeria I.Miyake 13
Phanerochaete P.Karsten 69
Phellinus Quélet 48
Phillipsia Berkeley 43
Phylacia Léveillé 38
Phyllachora Nitzschke ex Fuckel 34
Physalacria Peck 61
Physarella Peck 4
Physarum Persoon 4
Pleurotus (Fries)Quélet 62
Pluteus Fries 62
Poculum Velenovsky 42
Podoscypha Patouillard 50
Podostroma P.Karsten 31
Polydiscidium Wakefield 41
Polyporus Micheli ex Fries : Fries 51, 69
Poronia Willdenow 38, 69
Porostereum Pilat em.Hj. & Ryv. 54
Proliferodiscus Haines & Dumont 41
Psathyrella (Fries)Quélet 55
Pseudohydnum P.Karsten 45
Psilocybe (Fries) Kummer 63
Pterula Fries 53
Pulveroboletus Murrill 55
Pulvinula Boudier 42
Pycnoporus P.Karsten 52
Pyrofomes Kotlaba & Pouzar 52
Pyronema Carus 69
Pyrrhoglossum Singer 55
Ramaria S.F.Gray 53, 69
Rectipilus Agerer 49
Resupinatus S.F.Gray 69
Rhagadostroma Körber 34
Rhizomorpha Roth ex Fries 66
Rhodoarrhenia Singer 66
Rhodocybe R.Maire 56
Rhytidhysterion Spegazzini 13
Rhytisma Fries 69
Rigidoporus Murrill 52
Rosellinia de Notaris 69
Russula Persoon 63
Rutstroemia P.Karsten 42
Sacidium 69
Sarawakus Lloyd 31
Sarcopodium Ehrenberg 8
Schizophyllum Fries 54
Scleroderma Persoon : Persoon 66
Scutellinia (Cooke)Lambotte 42
Septobasidium Patouillard 45
Sesquicillium W.Gams 8
Seynesia Saccardo 16
Sinosphaeria Yue & O. Eriksson 34
Spegazzinia Saccardo 8
Sphaeria Haller 69
Sphaeropsis Léveillé 69
Staheliomyces Ed. Fischer 65
Stemonitis Roth 5
Stereopsis Reid 50
Stereum Persoon 54
Stictis Persoon 69
Stilbella Lindau 9
Stipitochaete Ryvarden 49
Striatosphaeria Samuels & Müller 32
Termitaria Thaxter 9
Thamnomyces Ehrenberg ex Sprengel 38, 69
Thaxteria Saccardo 32
Theissenia Maublanc 39
Thelephora Ehr.: Fries 69
Trametes Fries 52, 69
Trematosphaeria Fuckel 14
Tremella Persoon 45
Triblidium Rebentisch 66
Trichaptum Murrill 53
Trichia Haller 6
Tricholoma (Fries) Quélet 64
Tricholomopsis Singer 64
Trichosphaerella Bomm., Rouss. & Sacc. 32
Trogia Fries 61
Tubercularia Tode 9
Tubeufia Penzig & Saccardo 14
Tubifera J.F.Gmelin 5
Uredo Persoon 66
Ustulina L.R. & C. Tulasne 39
Uvaricospora Goos & Pirozynski 9
Valetoniella Von Höhnel 32
Valsaria Cesati & De Notaris 34
Volvariella Spegazzini 63

Xenolophium H.Sydow 12
Xeromphalina Kühner & Maire 61
Xylaria Hill ex Greville 39, 69
Xylobotryum Patouillard 10
Xylocoremium 9
Xylophallus (Schlecht.)Ed.Fischer 65

EPITHETONS INDEX

The epithetons in brackets are those of binomials given in the doubtful species list.

abbreviatum Glonium 10
abnorme Lachnum 41
acanthostroma Nitschkia 33
acervatum Nodulisporium 8
aciculosa Stilbella 9
(acrocomiae) Dothidea 68
actinopus Marasmius 59
(aculeata) Hexagona 68
acutissima Ramaria 53
adscendens Xylaria 39
aenea Xylaria 39
(aequinoctiale) Cenangium 67
aethalodes Daedalea 50
aethalus Pluteus 62
(agariceus) Polyporus 69
alata Nectria 19
alba Apiocamarops 17
albocincta Ostropella 12
albocinerea Ramaria 53
(alboluteus) Agaricus 67
(alborubellus) Pluteus 67
albostipitatus Pluteus 63
aleuriata Stilbella 9
allantoidea Xylaria 39
amaurodermatis Hypomyces 19
(amethystea) Clavulina 67
andina Heterochaete 45
andinum Xylobotryum 10
anisopleura Xylaria 39
annellosynnema Acrostroma 7
annulipes Batistia 16
annulosa Psathyrella 55
anthracobia Pulvinula 42
(anthracodes) Hypoxylon 68
(apeibae) Xylaria 69
(applanata) Micropeltis 68
(applanata) Peziza 68
applanatum Xenolophium 12
arctii Diaporthe 18
(arecarium) Hypoxylon 68
aristata Xylaria 39
arundinarius Arthridium 7
asper Coriolopsis 50
(asphaltum) Hypoxylon 68
(astrocaryi) Rhytisma 69
atrogrisea Tricholomopsis 64
atrorubens Marasmius 59
atrosphaerica Xylaria 39
aurantia Tremella 45
aurantiacus Pyrofomes 52
aurantiella Tubeufia 14
aureofulva Nectria 20
auricolor Orbilia 42
(auricula-judae) Auricularia 67
auriscalpium Amauroderma 47
auriscalpium Favolaschia 47
australe Ganoderma 47
australis Hypomyces 19
axifera Xylaria 39
bacillum Leprieuria 38
balansiae Nectria 20
bambusicola Acrodictys 7
berkeleyana Hymenochaete 48
berkeleyi Peristomialis 31
berkeleyi Xylaria 39
bertieri Lentinus 61
(beyrichii) Trametes 69
bilabiata Camillea 35
bipapillatus Penicillifer 8
biporosa Camarops 17
bisporum Pseudohydnum gelatinosum v. 45
bisporus Hydropus 58
bisterigmatica Clavaria 46
bivalve Physarum 4
blumenaviensis Scutellinia 43
bogoriense Physarum 4
bombarda Tubifera 5
boryana Lentinula 59
brachypora Echinochaete 50
brachyspermus Pulveroboletus 55

(brasiliensis) Clavaria 67
brasiliensis Favolus 50
brasiliensis Nectria 20
brasiliensis Podoscypha 50
brevipes Hypocrea 18
brevispora Hygrocybe nigrescens var. 57
broadwayi Agrocybe 54
brunnea Russula moyersoenii var. 63
buccinalis Trogia 61
byssicola Nectria 20
byssogenum Trichaptum 53
byssotecta Nectriopsis 30
calami Nectria 20
calyculata Hemitrichia 6
calyculus Calyculosphaeria 33
campanulatus Panaeolus 55
(campestris) Agaricus 67
canarii Oudemansiella 56
cancellatum Dictydium 4
cantharelloides Trogia 61
caperata Datronia 50
(catervaria) Lembosia 68
(caulium) Corticium 67
caulium Lophiostoma 11
(cayennensis) Polypo. grammocephalus v. 69
(cepaestipes) Leucocoprinus 68
cervina Disciseda 65
chaetopsinae Nectria 20
chaetopsinae-penicillatae Nectria 21
cheilocystidiata Hygrocybe 56
chordalis Thamnomyces 38
cinctus Staheliomyces 65
cinerea Arcyria 6
cinnabarina Nectria 21
cinnamomea Nectria 21
cissi Mycosyrinx 66
cladophyllus Marasmius 60
clavulata Stilbella 9
clavus Kretzschmaria 37
clintonii Tubeufia 14
(clivulosa) Sphaeria 69
(clypeolaria) Lepiota 68
coccifera Rhagadostroma 34
(coccinea) Nectria 68
coccophora Xylaria 39
codinophora Striatosphaeria 32
(coenopus) Hypoxylon 68
colhounii Calonectria 18
(collabens) Xylaria 69
collapsa Calyculosphaeria 33
(collecticus) Agaricus 67
(columnifera) Xylaria 69
(comaropsis) Hypoxylon 68
commune Schizophyllum 54
comosa Xylaria 39
compressa Xylaria 39
compressum Physarum 4
concavus Lentinus 61
concentrica Daldinia 36
confertus Rectipulus 49
confusa Trematosphaeria 14
(congregatus) Marasmius 68
(conica) Hygrocybe 68
conostoma Penzigia 38
cookei Melanographium 8
coprophila Psilocybe 63
coralloides Calocera 44
cordiae Aecidium 66
(cornea) Calocera 67
corneri Gloeocantharellus 48
(corniculata) Clavulinopsis 67
corniformis Xylaria 39
(cornucopioides) Craterellus 68
coronata Nectria 21
coronata Termitaria 9
corticis Botryosphaeria 9
corticola Massarina 11
corynephora Rhizomorpha 66
costata Cribraria 3
(crassa) Phanerochaete 69
crassum Tricholoma 64
crinitus Lentinus 62
crispus Clathrus 64
(cristata) Clavulina 67
crocatum Poculum 42
(croceus) Polyporus nitidus var. 69
(cruciatus) Lysurus 68
crucipila Valetoniella 32
cruentatum Triblidium 66
cubensis Encoelia 41
cubensis Psilocybe 63
cubensis Trametes 52
cubensis Xylaria 39
(cubosporus) Agaricus 67
(cultriger) Agaricus 67
curta Xylaria 39

cyanocephala Ramaria 53
cyathiforme Gerronema 64
cyclisca Camillea 35
cyclopicum Hypoxylon 36
cyclops Camillea 35
cylindrothecia Tubeufia 15
cystidiophora Heterochaetella 45
damaecornis Stipitochaete 49
dealbatus Asterotus 64
dealbatus Microporellus 51
decipiens Boletinus 55
decipiens Trichosphaerella 32
(decurrens) Marasmius 68
defibulatus Marasmiellus 59
deightonii Spegazzinia 8
delicata Auricularia 44
(delicata) Calocera 67
dendriticum Cymatoderma 50
dendroideus Thamnomyces 38
dennisii Lasiosphaeriella 32
denudata Arcyria 6
deusta Ustulina 39
dictyopus Polyporus 51
dilatata Pterula 53
discedens Bisporella 41
discophora Nectria 21
(dispar) Marasmius 68
disrupta Botryosphaeria 9
djamor Pleurotus 62
eggersii Crinipellis 58
elasticae Chaetospermum 7
elegans Trametes 52
(endoxanthum) Hypoxylon 68
enterogena Xylaria 39
eperuae Podostroma 31
epidendron Lycogala 5
epimycota Nectriopsis 30
(episphaeria) Nectria 68
epitheliosus Lactarius 63
(erinaea) Diatrype 68
erumpens Seynesia 16
erysipheoides Niesslia 32
erythrinae Byssosphaeria 11
escholzii Daldinia concentrica var. 36
etiolata Pulvinula 42
euglypta Coccoidella 10
examinans Auerswaldia 9
exiguum Lycogala 5
(exsurgens) Hypoxylon 68
(extensus) Polyporus 69
fasciatus Fomes 51
fasciatus Lentinus 62
favoginea Trichia 6
feejensis Xylaria 40
fendleri Favolaschia 47
ferrugineus Marasmius 60
ferruginosa Tubifera 5
(fibrosoradiatus) Polyporus 69
fibulifera Tremella 45
fimbriata Tremella 45
fimbriatus Hydnopolyporus (&
firma Hygrocybe 56
flammea Nectria 21
flavo-lanata Nectria 21
flavovirens Hypocrea 18
flocculenta Nectria 21
floridana Nitschkia 33
fluminensis Pluteus 63
foliicola Nectria 22
(foliicolum) Hysterium 68
(formosa) Ramaria 69
formosus Dacryopinax 44
fornicatum Ganoderma 47
fossulata Camillea 35
fragilissima Coltricia 48
fruticulosa Ceratiomyxa 3
fujikuroi Gibberella 18
fuligineum Lycoperdon 65
fulviceps Marasmius 60
(fulvipes) Agaricus 67
fungicola Berlesiella 10
(fusariispora) Sphaeria 69
fusca Hypocrea 19
fusca Stemonitis 5
fusca Stilbella 9
fuscosuccinea Auricularia 44
fuscus Cyclomyces 48
fusispora Chaetosphaeria 34
gaertneriana Hypocrella 17
(gamophyllus) Marasmius 68
(gastrodes) Agaricus 67
gelatinosa Hypocrea 19
gelatinosum Pseudohydnum 45
gigantea Ramaria 53
gilvus Phellinus 48
(gilvus var. scabrorugosus) Polyporus 69

(glabrata) Hexagona aculeata fo. 68
(globosa) Xylaria 69
globuliferum Physarum 4
(glossoides) Calocera 67
glycirrhiza Hypoxylon 37
(gomphus) Xylaria 69
gossypina Nectria 22
gracilipes Nectria 22
gracilis Filoboletus 58
gracillima Xylaria 40
graminicola Ophiosphaerella 13
grammica Xylaria 40
grammicospora Nectria 22
(grammocephalus var. cayennensis) Pol. 69
grande Ophiostoma 34
(granulosa) Naematelia 68
gregarium Nodulisporium 8
grevillei Nitschkia 33
(griseolutescens) Agaricus 67
griseoroseus Marasmius 60
(griseorubens) Agaricus 67
griseus Dennisiomyces 56
guadeloupensis Aphelaria 46
guepinii Pestalotia 8
guianense Xenolophium 12
guianensis Cantharellus 46
guianensis Cordierites 41
guianensis Hygrocybe 56
guianensis Marasmius 60
guianensis Neotyphula 68
guianensis Polyporus 51
guianensis Ramaria 53
guianensis Xylaria 40
(gyrosum) Rhytisma 69
haedinus var.minor Marasmius 60
haematocephalus Marasmius 60
(haematochrous) Agaricus 67
haematococca Nectria 23
helenae Cyathus 65
helicoma Tubeufia 15
(heliconia) Hendersonia 68
(heliscus) Poronia 69
helvolus Marasmius 60
hemispila Melanochaeta 32
(heteromera) Midotis 68
heterostoma Camillea 35
(hindsii) Peziza 68
hiscens Stereopsis 50
holophaea Lactocollybia 58
(hortensis) Agaricus 67
(hortulanus) Agaricus 67
hydnoides Hexagonia 51
hydrophora Aquascypha 49
hygrophanus Nothopanus 62
hygrophytica Russula 63
(hyperythra) Xylaria 69
hypohaemacta Hygrocybe 56
hypomiltum Hypoxylon 37
hypoxylon Immotthia 10
hypoxylon Xylaria 40
ianthino-velutina Xylaria 40
illudens Nectria 24
impariphiale Sesquicillium 8
impariphialis Nectria 24
impressa Hypocrea 19
(incrustans) Hypoxylon 68
incrustatus Marasmiellus 59
indacocheae Dacryopinax 44
indica Penzigia 38
indusiata Dictyophora 65
innumera Chaetosphaeria 34
insigne Ramaria 53
insignis Arcyria 6
inspersus Proliferodiscus 41
iodinus Cyclomyces 48
iridis Didymium 4
irradians Neohypodiscus 38
jamaicana Byssosphaeria 11
jatrophae Nectria 24
javanicum Physarum 4
joca Nectria 24
jungeri Nectria 24
kegeliana Xylaria 40
kyotensis Calonectria 18
(labecula) Asterina 67
labellum Camillea 35
laetidiscoides Nectria 25
lageniforme Geastrum 64
lagopus Coprinus 55
(lancicula) Hirneola 68
larvata Cordyceps 17
lasiacidis Endocreas 18
lasiacidis Nectria 25
lasiacidis Sinosphaeria 34

latemarginatus Oxyporus 51
lateritia Tubercularia 9
latispora Bertia moriformis var. 33
leoninus Marasmius 60
leprieuri Angelina 41
leprieuri Camillea 36
(leprieuri) Enslinia 68
leprieuri Phaeoschizophyllum 54
leprieuri Polyporus 51
leprieuri Septobasidium 45
(leptopilus) Agaricus 67
leptosporioides Thaxteria 32
leptosporus Coccomyces 42
leucocephalum Craterium 4
leucorrhodina Nectriopsis 30
licnoides Phellinus gilvus var. 49
lignicola Uvaricospora 9
(lignifraga) Hiatula 68
lilacinella Hygrocybe 56
(liliputiana) Thelephora 69
liliputianus Chaetocalathus 57
limbatus Cyathus 65
lipsiense Ganoderma 47
lobatum Stereum 54
longa Comatricha 5
longipes Haddowia 48
lucida Nectria 25
lucidula Kretzschmaria 37
lucidum Ganoderma 47
lucifer Nectria 25
lutea Hypocrea 19
lutescens Tremella 45
lycogaloides Sarawakus 31
lycopersicum Entoloma 56
macrobarbatra Acanthonitschkia 32
(macromphalum) Hypoxylon 68
macrorhiza Podoscypha 50
(macrospermum) Hypoxylon 68
macrospora Nitschkia 34
macrospora Camillea heterostoma var. 35
macrostoma Nectria 25
magniverrucosa Ophionectria 30
mangiferae Cytosphaera 7
(mangiferae) Lemalis 68
mammiformis Nectria 26
(mammiformis) Rosellinia 69
(marginata) Micropeltis 68
(maroniensis) Hygrophorus 68
martinicensis Hygrocybe 56
martinii Dacryopinax 44
martynii Polydiscidium 41
(mauritiae) Sacidium 69
mauritiicola Nectria 26
medulla-panis Perenniporia 51
megalospora Macrovalsaria 66
(melaleucus) Leocarpus 68
(melanoplaca) Cheilaria 67
menziesii Trametes 52
(mesenterica) Auricularia 67
meznaensis Lasiosphaeria 31
microcarpa Cribraria 4
microceras Xylaria 40
micromeria Calosphaeria 17
microporus Rigidoporus 52
microscopica Lambertella 42
microsperma Tubifera 5
microsporus Penicillifer 8
(microsticta) Stictis 69
(microstictum) Hypoxylon 68
milletiae Herpotrichia 11
miniata Hygrocybe 57
minima Phaeosphaeria 13
minoensis Astrosphaeriella 13
minor Marasmius haedinus var. 60
minutella Volvariella 63
mirabile Geastrum 64
(mirabilis) Agaricus 67
mirabilis Astrocystis 35
mirabilis Coprinus 55
modesta Trametes 52
molybdites Chlorophyllum 54
montagneanus Marasmius 60
montagnei Caripia 46
(montagnei) Hypolyssus 68
monticulosum Hypoxylon 37
mori Hysterographium 10
moriformis Bertia 32
moseri Lasiosphaeria 31
moyersoenii var.brunnea Russula 63
mucida Lentaria 49
mucronata Camillea 36
multiplex Xylaria 40
multiplicatum Ganoderma 47
(myosurus) Xylaria 69
(myrciae) Rhytisma 69
myriocarpa Chaetosphaeria 34

neogrammicospora Nectria 26
neotropica Collybia 58
(nigella) Thelephora 69
nigra Comatricha 5
nigrescens var.brevispora Hygrocybe 57
nigricans Hypocrea 19
nigripes Marasmiellus 59
nigritus Hydropus 58
(nigrocinctus) Hypochnus 68
nitidula Podoscypha 50
(nitidula) Sphaeria 69
(nitidum) Pemphidium 68
(nitidus var. croceus) Polyporus 69
(nivea) Clavaria 67
niveus Marasmius 60
nodulisporus Hygroaster 56
noonae-dana Lasiosphaeriella 32
nouraguensis Hygrocybe 57
nucigenum Hypoxylon 37
nucleatum Physarum 4
obovata Xylaria 40
obovatus Microporellus 51
obularia Camillea 36
occidentalis Coriolopsis 50
occidentalis Hygrocybe 57
ochroleuca Nectria 26
(oedema) Sphaeria 69
oedipus Poronia 38
(oenochrous) Agaricus 67
oerstadii Ganoderma 47
oligotricha Dysrynchys 13
olivacea Nectria 27
omphalodes Amauroderma 47
(omphalodes) Pyronema 69
opacum Ganoderma 47
oropensoides Nectriopsis 30
ostreatus Pleurotus 62
pachythele Xenolophium 12
pallescens Marasmius 60
pallida Hypocrea 19
pallida Stemonitis 5
paludosa Tubeufia 15
pancarribaea Ramaria 53
pannicola Chaetosphaeria 35
(papilionaceus) Panaeolus 68
(papyracea) Hexagona 68
papyrinum Porostereum 54
(paradisiaca) Sphaeropsis 69
paraguayense Craterium 4
paraguayensis Hohenbuehelia 64
paraparilis Peristomialis 31
parasitica Capronia 10
parilis Peristomialis 31
patella Hypocrea 19
pectinata Galerina 55
(pediades) Agrocybe 67
penetrale Physarum 4
penicilliferi Nectria 27
pensilis Rhodoarrhenia 66
perciliata Volvariella 63
(perennis) Coltricia 67
perrottetii Trichaptum 53
perrumpens Trematosphaeria 14
pertusa Nectria 27
pezizoides Gaillardiella 33
pezizula Tubeufia 15
phaeostroma Chaetosphaerella 34
phaselina Diatrype 18
phlebiaeformis Hapalopilus 46
phlyctidospora Aleuria 42
(phoenicis) Graphiola 68
(phoenix) Hypoxylon 68
(phomatoides) Ascospora 67
(phomatoides) Phacidium 69
phyllocharis Xylaria 40
(phyllogena) Hypocrea 68
phyllophila Iodosphaeria 16
(phylloplacus) Dothidea 68
(pilosiuscula) Agaricus 67
pityrodes Nectria 27
plectophylla Collybia 58
plicatilis Coprinus 55
plicatus Cyathus 65
poculiformis Phyllacia 38
poecilus Marasmius 60
polyblastiae Chaetopsina 7
polycladus Marasmius 60
polygramma Collybia 58
polymorpha Xylaria 40
polyporicola Gliocladium 7
polytricha Auricularia 44
(porosum) Hypoxylon 68
(praecox) Agrocybe 67
proletarius Marasmius 60
(pseudobombarda) Sphaeria 69
pseudocinnabarina Nectria 27

pseudotrichia Nectria 27
pulchra Gibellula 7
pumila Xylaria 40
(pura) Mycena 68
purtonii Nectria 28
pusillus Panellus 64
pusio Marasmius 60
pyrenocartia Theissenia 39
quercina Diatrypella 18
quercuum Botryosphaeria 9
quisquilarium Hypoxylon 37
raciborskyi Lasiosphaeria 31
(radicalis) Diatrype 68
radicans Stereopsis 50
radicata Ditiola 45
radicellicola Marasmius 60
radicicola Nectria 28
reniformis Stipitochaete 49
(resinaceum) Ganoderma 68
rhabarbarinum Septobasidium 45
rhabarbarinus Marasmius 61
(rhabidosperma) Sphaeria 69
rheicolor Hymenochaete 48
rhizocola Xylaria 40
(rhizomorpha) Xylaria 69
rhizomorphus Polyporus 51
rhodomphala Byssosphaeria 11
rhopalina Phyllachora 34
rhytismatis Lachnum 41
rigidiuscula Nectria 28
rolfsii Athelia 46
roraimense Ophiostoma 34
roraimensis Tubeufia 15
(rostratus) Thamnomyces 69
rubellus Marasmiellus 59
rubiginosum Hypoxylon 37
rubricosa Valsaria 34
rubricosus Marasmius 61
rubrococca Nectria 28
(rufa) Hypocrea 68
rufescens Marasmius 61
rufocornea Lanzia 42
rufulum Rhytidhysterion 13
rufum Microglossum 41
(rugatus) Marasmius 68
(ruginosa) Xylaria 69
rugosuM Amauroderma 47
rugulosa Nectria 28
rutilans Hapalopilus 46
saccatum Geastrum 64
sagraeana Trametes 52
samuelsii Xenolophium 12
(sanguinea) Nectria 68
sanguineus Pycnoporus 52
sapiicola Pluteus 63
scabrida Arachnocrea 18
(scabrorugosus) Polyporus gilvus var. 69
scabrosa Earliella 50
schiedermayriana Byssosphaeria 11
(schizostoma) Sphaeria 69
schomburgkii Amauroderma 47
schweintizii Hypocrea 19
shimekii Javaria 14
scitula Nectria 28
scleriae Uredo 66
scleroderma Camarops 17
(scleroderma) Geastrum 68
sclerophaeum Hypoxylon 37
scopicola Xylaria 40
scopula Tubeufia 16
scriblita Camillea 36
scruposa Xylaria 40
sector Trichaptum 53
semitranslucens Hypomyces 19
septica Fuligo 4
septospora Nectria 28
septosporum Cylindrocarpon 7
septotricha Crinipellis 58
(sequatorius) Agaricus 67
sergii Pluteus 63
serpula Hemitrichia 6
sesquicillii Nectria 28
setofusariae Nectria 29
setosum Fusarium 7
siennophylla Conocybe 55
sinnamariense Scleroderma 66
siparia Hygrocybe 57
smithii Mycopepon 12
solmsii Lycogalopsis 65
spathularia Dacryopinax 44
spathulata Coltricia 48
speciosa Cookeina 43
spectabilis Cotylidia 49
sphaerosperma Ceratiomyxa 3
spissa Ceriporia 50
splendens Stemonitis 6

splitbergeri Inonotus 48
splitbergeri Marasmius 61
(spodoides) Agaricus 67
(sprucei) Coriolopsis 67
squamulosus Leucocoprinus 54
stellata Astrosphaeria 13
stellatum Physarum 5
(stellulata) Diatrype 68
stenophylloides Marasmiellus 59
stenophyllus Marasmiellus 59
stilbellae Nectria 29
stipitatum Pyrrhoglossum 55
(stangulans) Cordyceps 67
striatispora Amphisphaeria 16
striatulus Lentinus 62
(striatulus) Resupinatus 69
striatum Gloeophyllum 51
strigosus Lentinus 62
striispora Nectria 29
subannulatum Hypoxylon 37
subfalcata Nectria 29
subflavida Hygrocybe 57
subiculosus Hypomyces 19
subolivascens Chamaeota 62
subquaternata Nectria 29
suffulta Nectria 29
sulcatum Hypoxylon 37
(sulcigena) Sphaeria 69
sulcipes Cookeina (see *speciosa*)
surculus Lentaria 49
swartzii Lentinus 62
sylvana Nectria 29
syringea Collybia 58
tageticolor Marasmius 61
taxiformis Pterula 53
telfairi Xylaria 40
tenue Gerronema 64
tenuiculus Polyporus 51
tenuipes Xeromphalina 61
tenuis Hexagonia 51
tephroleucus Lentinus 62
termitarius Laboulbeniopsis 66
terrae-firmae Hydropus 58
tesselata Mycena 61
testacea Rhodocybe 56
testaceum Ganoderma 47
tetraspora Phillipsia 43
thelephorus Hydnodon 54
theobromae Lasiodiplodia 8
tinctor Camillea 36
tingomariensis Hypocrea 19
tornata Astrosphaeriella 13
tornatum Ganoderma 48
trichocephala Mycena 61
(trichodes) Sphaeria 69
tricholoma Cookeina 43
tricholoma Polyporus 51
trichospora Ophionectria 30
triqua Nectria 30
(tristiusculus) Polyporus 69
trochus Astrosphaeriella 14
(tropica) Antennaria 67
tropica Aphelaria 46
troyanus Marasmiellus 59
truncatum Hypoxylon 37
tubercularia Tremella 45
tubulosum Lachnocladium 49
tucuchense Entoloma 56
typhoides Comatricha 5
(uberina) sphaeria 69
ulmarius Rigidoporus 52
(umbellula) Conocybe 67
umbrinum Schizophyllum 54
urbica Crinipellis 58
urticaria Diatrype 18
ustulinoides Camarops 17
(variolosa) Stictis 69
velutinum Geastrum 65
(velutinus) Coriolus 67
velutinus Lentinus 62
venezuelae Fistulinella 55
verminosum Linocarpon 31
vermispora Nectria 30
versicolor Trametes 52
vesuvius Astrosphaeriella 14
vilior Nectria 30
villosa Byssosphaeria 12
villosa Trametes 53
violaceotunicata Russula 63
viride Physarum 5
viridis Gomphus 48
volutella Melioliphila 14
volvatus Marasmiellus 59
wrightii Fluviostroma 35
(xylariicola) Hypocreopsis 68
xylogenus Xylophallus 65

zippelii Ramaria 53
zonalis Rigidoporus 52

Ackowledgements :

Thanks are due to D.N.Pegler (Kew, UK) and J.D.Rogers (Pullman, USA) who reviewed the paper and suggested valuable improvements. J.Mouchacca (Paris, F) is also acknowledged for having checked some of the type numbers in Montagne's and Leprieur's collections at PC.

BIBLIOGRAPHY

The list below gathers titles with quotations for french guianese collections. Thus, all these references are not cited in the text of the check-list itself, since herbarium collections have been given in priority against !itterature data when both exist. The senior author will be grateful to anybody drawing more references to his attention, in order to fullfill this check-list.

AREL L. -1984- La Lépiote de Morgan : champignon toxique rencontré en Guyane française. *Thèse de Doctorat de Pharmacie, Université de Bordeaux II, U.E.R. des Sciences Pharmaceutiques*, 1-63.

BERKELEY M.J. & M.A.CURTIS -1853- Exotic fungi from the Schweinitzian herbarium, principally from Surinam. *J.Acad.Nat.Sci.Philadelphia*, Ser.2, 2:277-294

BERTAULT R. -1984- Xylaires d'Europe et d'Afrique du Nord. *Bulletin Trimestriel de la Société Mycologique de France* 100(2):139-175

BLACKWELL M. & W.ROSS -1986- Biogeography of fungal ectoparasites of termites. *Mycotaxon* 25(2):581-601

BOISE J.R. -1987- *Mycopepon*, a new Ascomycete Genus. *Systema Ascomycetum*. 6(1):167-170.

BRAYFORD D. & G.J.SAMUELS -1993- Some didymosporous species of *Nectria* with non-microconidial *Cylindrocarpon* anamorphs. *Mycologia* 85(4):612-637

BURITICA P. & J.F.HENNEN -1980- *Pucciniosireae* (*Uredinales*, *Pucciniaceae*). *Flora Neotropica*, New-York, 24:1-50.

CALLAN B.E. & J.D.ROGERS -1990- Teleomorph - anamorph connections and correlations in some *Xylaria* species. *Mycotaxon* 36(2):343-369.

CARPENTER S.E. -1981- Monograph of *Crocicreas* (Ascomycetes, Helotiales, *Leoticaeae*). *Memoirs of the New York Botanical Garden* 33:290 pp.

COOKE W.B. -1961- The genus *Schizophyllum*. *Mycologia* 53(6):575-599.

CORNER E.J.H. -1950- A monograph of *Clavaria* and allied genera. *Annales of Botany Memoirs* 1:740 pp.

CORNER E.J.H. -1966- A monograph of cantharelloid fungi. *Annales of Botany Memoirs* 2:255 pp.

CORNER E.J.H. -1981- The agaric genera *Lentinus*, *Panus* and *Pleurotus* with particular reference to malaysian species. *Nova Hedwigia Beihefte* 69:169 pp.

COURTECUISSE R. -1989- Eléments pour un inventaire mycologique des environs du Saut Pararé (Arataye) et de l'Inselberg des Nouragues (Guyane française). I. Introduction. II. *Hygrophoraceae*. *Cryptogamie, Mycologie* 10(3):181-216

COURTECUISSE R. -1991- Eléments pour un inventaire mycologique des environs du Saut Pararé (Arataye) et de l'Inselberg des Nouragues (Guyane française). V. *Pluteaceae*

(*Pluteales, Basidiomycota*). Studies in the Flora of the Guianas n°55. *Cryptogamic Botany* 2(2/3):136-152

COURTECUISSE R. & B.BUYCK -1991- Eléments pour un inventaire mycologique des environs du Saut Pararé (Arataye) et de l'Inselberg des Nouragues (Guyane française). IV. *Russulaceae*. Studies in the Flora of the Guianas n°56. *Mycologia Helvetica* 4(2):209-225

COURTECUISSE R. & B.LOWY -1990- Elements for a mycological inventory of the vicinity of "Saut Pararé" (Arataye river) and "Nouragues inselberg" (French Guiana). III. *Heterobasidiomycetideae*. Studies on the Flora of the Guianas, No. 52. *Mycotaxon* 39:329-344

DAVID A. -1970- Caractères mycéliens de quelques polypores de la Guyane française. *Bulletin mensuel de la Société Linnéenne de Lyon* 39(8):261-268

DAVID A. & M.RAJCHENBERG -1985- Pore fungi from french Antilles and Guiana. *Mycotaxon* 22(2):285-325

DENNIS R.W.G. -1951- Some *Agaricaceae* of Trinidad and Venezuela. *Leucosporae*, part I. *Transactions of the British Mycological Society* 34(4):411-482

DENNIS R.W.G. -1970- Fungus flora of Venezuela and adjacent countries. *Kew Bulletin, Additional Series* 3:531 pp.

Di COSMO F., T.R.NAG RAJ & W.B.KENDRICK -1984- A revision of the *Phacidiaceae* and related anamorphs. *Mycotaxon* 21:1-234

DOI Y. & K.YAMATOYA -1989- *Hypocrea pallida* and its allies (*Hypocreaceae*). *Memoirs of the New York Botanical Garden* 49:233-242

DUMONT K.P. -1981- *Leotiaceae* II. A preliminary survey of the neotropical species referred to *Helotium* and *Hymenoscyphus*. *Mycotaxon* 12(2):313-371

FARR M.L. -1966- The didymosporous dimeriaceous fungi described on leaves of *Gramineae*. *Mycologia* 58(2):221-248

FARR M.L. -1976- Myxomycetes. *Flora Neotropica*, New-York, 16:1-305

FIDALGO M.E.P.K. -1968- The genus *Hexagona*. *Memoirs of the New York Botanical Garden* 17(2):1-108

FIDALGO O. -1968- *Phellinus pachyphloeus* and its allies. *Memoirs of the New York Botanical Garden* 17(2):1-147

FIDALGO O. & M.E.P.K.FIDALGO -1968- *Polyporaceae* from Venezuela. I. *Memoirs of the New York Botanical Garden* 17(2):1-34.

FLOCH H.A. -1965- Un champignon toxique en Guyane Française : "La Lépiote de Morgan". *Archives de l'Institut Pasteur de la Guyane française et de l'Inini* 487:1-6

FURTADO J.S. -1981- Taxonomy of *Amauroderma* (Basidiomycetes, *Polyporaceae*). *Memoirs of the New York Botanical Garden* 34:1-108

HEIM R. -1967- Hygrophores tropicaux recueillis par Roger Heim. I. Espèces de Guyane française et de Nouvelle-Guinée australienne. *Revue de Mycologie* 32(1):16-27

HUHNDORF S.M. -1993- Neotropical Ascomycetes R. Reinstatement of the genus *Xenolophium* and two new species from French Guiana. *Mycologia* 85(3):490-502

HYDE K.D. -1988- The genus *Linocarpon* from the mangrove palm *Nypa fruticans*. *Transactions of the Mycological Society of Japan* 29:339-350

HYDE K.D. -1992- Fungi from palms. I. The genus *Linocarpon*, a revision. *Sydowia* 44:32-54

IMAI S. -1955- Contributione a studia monographica Geoglossacearum II. *Scientific Reports of the Yokohama National University* 2(4):1-11

ITURRIAGA T. -1994- Discomycetes of the Guyanas. I. Introduction and some *Encoelia* species. *Mycotaxon* 52(1):271-288

LAESSOE T., J.D.ROGERS & A.J.S.WHALLEY -1989- *Camillea, Jongiella* and light-spored species of *Hypoxylon*. *Mycological Research* 93(2):121-155

LOWY B. -1971- Tremellales. *Flora Neotropica*, New-York, 6:1-153

LUSK D.E. -1990- A new Pyrenomycete record for the new world. *Mycotaxon* 37:273

MELENDEZ-HOWELL L.M. -1986- Les champignons dans la dégradation de la forêt primaire de l'Arataye (Guyane Française). Introduction à la biologie des genres *Cookeina* Kunt. et *Phillipsia* Berk. "Vertébrés et forêts tropicales humides". Entretiens du Muséum. *Mémoires du Muséum national d'Histoire naturelle, Paris, Série A, Zoologie* 132:257-261

MONTAGNE C. -1841- Seconde centurie de Plantes cellulaires exotiques nouvelles, Musci. Décade IX. *Annales de Sciences Naturelles, Série Botanique*, II, 2(16):108-128

MONTAGNE C. -1851- Fungorum species novae surinamenses. *Tijdschrift voor de Wis- en Natuurkundige Wetenschappen* 4:203-204

MONTAGNE C. -1854- Cryptogamia Guyanensis, seu Plantarum cellularium in Guyana gallica annis 1835-1849 a Cl. Leprieur collectarum enumeratio universalis. II. Discomycetes. *Annales de Sciences Naturelles, Série Botanique*, IV, 3(2-3):91-144

MONTAGNE C. -1856- Sylloge Generum Specierumque Cryptogamarum quas in variis operibus descriptas iconibus illustratus, nunc ad diagnosis reductas,nonnullaeque novas interjectas, ordine systematice desposuit. Paris, 1-51

PADEN J.W. -1983- *Sarcosomataceae* (*Pezizales, Sarcoscyphineae*). *Flora Neotropica*, New-York, 37:1-17

PARMASTO E. -1978- The genus *Dictyonema* (Thelephorolichenes). *Nova Hedwigia* 29:99-144

PEGLER D.N. -1977- A preliminary agaric flora of East Africa. *Kew Bulletin, Additional Series* 6:615 pp.

PEGLER D.N. -1983a- Agaric flora of the Lesser Antilles. *Kew Bulletin, Additional Series* 9:668 pp. + 25 pl.

PEGLER D.N. -1983b- The genus *Lentinus*. A world monograph. *Kew Bulletin Additional Series* 10: 281pp.

PEGLER D.N. -1986- Agaric flora of Sri Lanka. *Kew Bulletin, Additional Series* 12:519 pp.

PETERSEN R.H. -1981- *Ramaria* subgenus *Echinoramaria*. *Bibliotheca Mycologica* 79:261 pp.

PILAT A.-1936- Revision der tropischen *Lentinus*-Arten aus dem Herbar des Botanischen Museums in Berlin-Dahlem. *Annales Mycologici* 34(1-2):108-140

RAPPAZ F. -1987- Taxonomie et nomenclature des Diatrypacées à asques octospores. *Mycologia Helvetica* 2(3):285-648

RODRIGUES K.F. & G.J.SAMUELS -1989- Studies in the Genus *Phylacia* (*Xylariaceae*). *Memoirs of the New York Botanical Garden* 49:290-297

ROGERS J.D., JU Y.-M. & T.LAESSOE -1994- *Neohypodiscus* nom.nov. for *Hypodiscus*. *Mycologia* 86(5):684-690

ROGERS J.D. & G.J.SAMUELS -1987a- *Camarops flava* sp.nov., *Apiocamarops alba* gen.et sp.nov, and notes on *Camarops scleroderma* and *C.ustulinoides*. *Mycotaxon* 28:45-59

ROGERS J.D. & G.J.SAMUELS -1987b- *Camarops biporosa* sp.nov., from french Guiana. *Mycotaxon* 28(2):415-417

ROGERSON C.T., R.C.HARRIS & G.J.SAMUELS -1990- Fungi Collected by Bassett Maguire and Collaborators in the Guayana Highland, 1944-1983. The Bassett Maguire Festschrift. *Memoirs of the New York Botanical Garden* 64:130-164

ROGERSON C.T. & G.J.SAMUELS -1989- Boleticolous species of *Hypomyces*. *Mycologia* 81:413-432

ROGERSON C.T. & G.J.SAMUELS -1992- New species of Hypocreales (Fungi, Ascomycetes). *Brittonia* 44:256-263

ROGERSON C.T. & G.J.SAMUELS -1993- Polyporicolous species of *Hypomyces*. *Mycologia* 85:231-272

ROSSMAN A.Y. -1989- A synopsis of the *Nectria cinnabarina*-group. *Memoirs of the New York Botanical Garden* 49:253-265

RYVARDEN L. -1981- Type studies of the *Polyporaceae* 13. Species described by J.H. Léveillé. *Mycotaxon* 13(1):175-183

RYVARDEN L.-1982- Type studies of the *Polyporaceae* 11. Species described by J.F.C. Montagne, either alone or with other authors. *Nordic Journal of Botany* 2:75-84

RYVARDEN L. -1985- *Stipitochaete* gen.nov. (*Hymenochaetaceae, Basidiomycotina*). *Transactions of the British Mycological Society* 85(3):535-539

RYVARDEN L. & I.JOHANSEN -1980- A preliminary polypore flora of East Africa. 636 pp.

SAMUELS G.J. -1976- A revision of the fungi formerly classified as *Nectria* subgenus *Hyphonectria*. *Memoirs of the New York Botanical Garden* 26(3):1-126

SAMUELS G.J. -1988a- Fungicolous, lichenicolous, and myxomyceticolous species of *Hypocreopsis*, *Nectriopsis*, *Nectria*, *Peristomialis*, and *Trichonectria*. *Memoirs of The New York Botanical Garden* 48:1-78

SAMUELS G.J. -1988b- Species of *Nectria* (Ascomycetes, *Hypocreales*) having orange perithecia and colorless striate ascospores. *Brittonia* 40(3):306-311

SAMUELS G.J. -1988c- Fungicolous, lichenicolous and myxomyceticolous species of *Hypocreopsis*, *Nectriopsis*, *Nectria*, *Peristomalis* and *Trichonectria*. *Memoirs of the New York Botanical Garden* 48:78 pp.

SAMUELS G.J. -1989a- *Nectria* and *Sesquicilium*. *Memoirs of the New York Botanical Garden* 49:266-285

SAMUELS G.J. -1989b- *Nectria* and *Penicillifer*. *Mycologia* 81:347-355

SAMUELS G.J. & D.BRAYFORD -1993- Phragmosporous *Nectria* species with *Cylindrocarpon* anamorphs. *Sydowia* 45(1):55-80

SAMUELS G.J., E.MÜLLER & O.PETRINI -1987- Studies in the *Amphisphaeriaceae* (sensu lato) 3. New species of *Monographella* and *Pestalosphaeria* and two new genera. *Mycotaxon* 28(2):473-499

SAMUELS G.J. & H.NIRENBERG -1989- *Nectria* and *Fusarium* 1. *Nectria setofusariae* and its anamorph *Fusarium setosum*. *Canadian Journal of Botany* 67:3372-3377

SAMUELS G.J. & K.F.RODRIGUES -1989- *Batistia annulipes* and its anamorph, *Acrostroma anellosynnema*. *Mycologia* 81:52-56

SAMUELS G.J. & J.D.ROGERS -1987- *Camarops flava* sp.nov., *Apiocamarops alba* gen.et sp.nov., and notes on *Camarops scleroderma* and *C.ustulinoides*. *Mycotaxon* 28(1):45-59

SAMUELS G.J. & C.T.ROGERSON -1989- *Endocreas lasiacidis* and *Sinosphaeria lasiacidis*, new tropical ascomycetes. *Studies in Mycology* 31:145-149

SAMUELS G.J., A.Y.ROSSMAN, R.L.LOWEN & C.T.ROGERSON -1991- A synopsis of *Nectria* subg. *Dialonectria*. *Mycological Papers* 132:

SAMUELS G.J. & K.A.SEIFERT -1991- Two new species of *Nectria* with *Stilbella* anamorphs. *Sydowia* 43:249-263

SCHATZ S. -1988- *Hypoxylon oceanicum* sp.nov., from mangroves. *Mycotaxon* 33:413-418

SCHUMACHER T. -1988- The *Scutellinia* battle ; the lost, missing and dead. *Mycotaxon* 33:149-189

SHERWOOD M.A. -1977- The ostropalean fungi. *Mycotaxon* 5(1):1-277

SINGER R. -1970- *Omphalinae* (*Clitocybeae-Tricholomataceae*, Basidiomycetes). *Flora Neotropica*, New-York, 3:1-84

SINGER R. -1970- *Phaeocollybia* (*Cortinariaceae*, Basidiomycetes). *Flora Neotropica*, New-York, 4:1-13

SINGER R. -1970- *Strobilomycetaceae* (Basidiomycetes). *Flora Neotropica*, New-York, 5:1-35

SINGER R. -1973- The genera *Marasmiellus, Crepidotus* and *Simocybe* in the Neotropics. *Nova Hedwigia Beihefte* 44:1-517

SINGER R. -1974- A monograph of *Favolaschia*. *Nova Hedwigia Beihefte* 50:108 pp.

SINGER R. -1975- The Agaricales in Modern Taxonomy. J. Cramer, Vaduz. 912 pp.

SINGER R. -1976- *Marasmieae* (Basidiomycetes-*Tricholomataceae*). *Flora Neotropica*, New-York, 17:1-346

SINGER R. -1982- *Hydropus* (Basidiomycetes-*Tricholomataceae-Myceneae*). *Flora Neotropica*, New-York, 32:1-153

SIPMAN H.J.M. & A.APTROOT -1992- Results of a botanical expedition to Mount Roraima, Guyana. II. Lichens. *Tropical Bryology* 5:70-107

SIVANESAN A. -1975- Redisposition and description of some *Amphisphaeria* species and a note on *Macrovalsaria*. *Transactions of the British Mycological Society* 65(2):395-402

STEVENS F.L. -1918- Some meliolicolous parasites and commensals. *Botanical Gazette* 65:227-249

THORN R.G. & G.L.BARRON -1986- *Nematoctonus* and the Tribe *Resupinatae* in Ontario, Canada. *Mycotaxon* 25(2):321-453

WALKER J. -1980- *Gauemannomyces, Minocarpon, Ophiobolus* and several other genera of scolecospored Ascomycetes and *Phialophota* conidial states, with a note on *Hyphopodia*. *Mycotaxon* 11(1):1-129

WATLING R. & N.M.GREGORY -1981- Census catalogue of world members of the *Bolbitiaceae*. *Bibliotheca Mycologica* 82:224 pp.

WELDEN A.L. & C.L.OVREBO -1989- Notes on tropical and warm temperate Basidiomycetes. *Mycotaxon* 34(2):601-614

ZHUANG W.Y. -1988- Studies on some Discomycetes genera with an ionomidotic reaction: *Ionomidotis, Poloniodiscus, Cordierites, Phyllomyces* and *Ameniglhiella*. *Mycotaxon* 31(2):261-298

MYCOTAXON

Volume LVII, pp. 87-95 January-March 1996

FOUR NEW SPECIES AND SOME NEW RECORDS OF MELIOLACEOUS FUNGI FROM KENYA

R. K. MIBEY, J. O. KOKWARO

Department Of Botany, University Of Nairobi,
P. O . Box 30197, Nairobi, Kenya

and

D. N. MUKUNYA

Department Of Botany, University Of Nairobi,
P. O . Box 30197, Nairobi, Kenya

Four new species of Ascomycota belonging to the *Meliolaceae* collected from Mau forest in western Kenya between 1989 and 1992 are described and compared with closely related species. They include, *Appendiculella mauensis* on *Casearia battescombei*, *A. rubi* on *Rubus keniensis*, *Asteridiella mathengeiana* on *Ehretia cymosa* and *A. trichocladi* on *Trichocladus ellipticus*. In addition, *Asteridiella aguariae* Hansf. on *Aguaria salicifolia* is reported for the first time in Kenya and *A. nuxiae* (Syd.) Hansf. on *Nuxia congesta* is a new record.

KEY WORDS: *Appendiculella*, *Asteridiella*, Meliolaceous fungi.

INTRODUCTION

Studies on African *Meliolaceae* are resumed after a period of over 30 years. Systematic work on this family was mainly confined to southern Africa and some parts of west and east Africa (Hansford, 1961). In east Africa only Uganda was surveyed. This contribution deals with six species of the family *Meliolaceae*, herein represented by the genera *Appendiculella* and *Asteridiella*, from Mau forest in western Kenya. The forest lies between 0°

and 1° 5''N and 35° and 36° E, a distance of about 350 km. north west of Nairobi, at an altitude which ranges from 1500 to 2000 m. above sea level. The forest consists mainly of tropical evergreen trees endemic to Kenya (Gillet & McDonald, 1970).

MATERIALS AND METHODS

Specimens of infected leaves used in this study were collected and put in brown paper bags, and labelled accordingly. The leaf specimens were then brought to the laboratory and dried between blotters daily for five days. Material for examination was mounted in water and observed under a Carl Zeiss compound microscope equipped with a camera lucida drawing apparatus. Measurements of hyphal cells, ascomata, appendages, ascospores and hyphopodia were then made from these mounts. All specimens used in this study were deposited at the University of Nairobi herbarium (NAI).

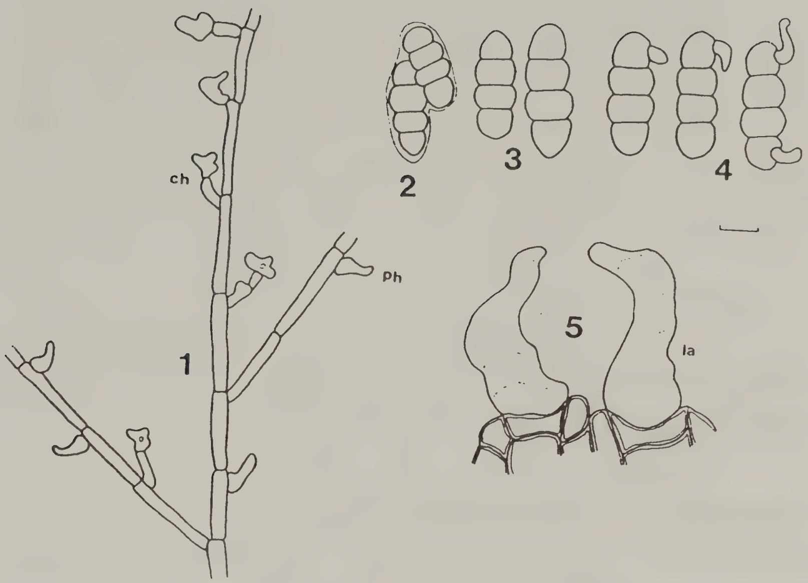
TAXONOMY

Appendiculella mauensis R. K. Mibey sp. nov. Figs 1-5.
Etymology: *mauensis* (Latin), in reference to Mau forest from which the specimens were collected.

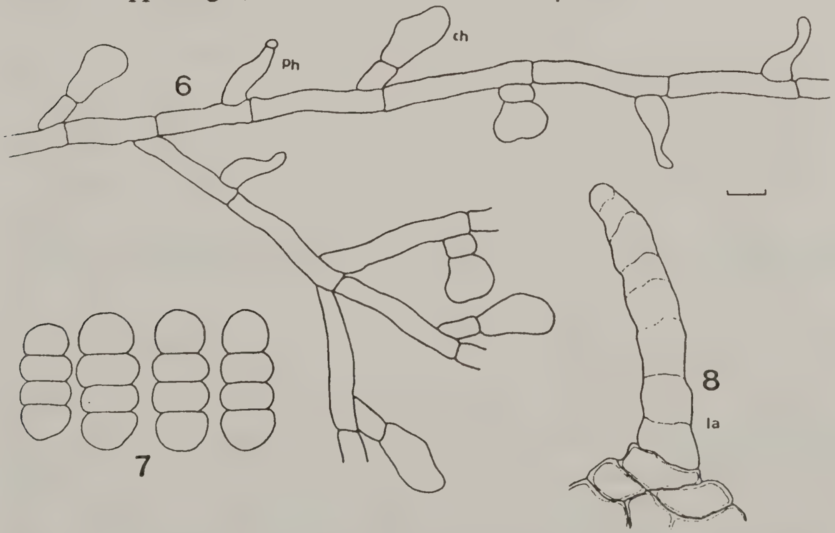
Plagulae amphigenae, densae, ad 8 mm diam. Hyphae plerumque rectae, laxe reticulatae, alternatae acuteque ramosae, cellulis 24 - 60 x 4 - 6 μm. Hyphopodia capitata alternata, laxe potentia, recta vel curvata, 24 - 52 x 10 - 20 μm, cellula apicali 1 - 2 lobata, 12 - 20 x 12 - 20 μm, cellula basali 1 - 2 septata, rectae vel curvatae, 14 - 32 x 4 - 10 μm. Phialis et hyphopodia capitata commixta, alternata, ampulliformi, recta vel curvata, 14 - 24 x 4 - 8 μm. Ascomata dipersae, verrucosa, 350 - 496 μm diam. Larviformibus appendiculae plerumque brunneae, transversaliter striatae, apices obtusae, 42 - 108 x 20 - 36 μm. Ascosporae 3 - septatae, fusoideae, brunneae, obtusae, constrictae, 44 - 66 x 14 - 16 μm.

Holotypus: **Kenya**: Mau forest, in folii *Caseariae battiscombei* (*Flacourtiaceae*), 10 Aug. 1989, leg. *R. K. Mibey*, 0128 NAI.

Colonies amphigenous, dense, up to 8 mm diam. Hyphae mostly straight, very loosely reticulate, branching alternate at acute angles, cells 24 - 60 x 4 - 6 μm. Capitate hyphopodia alternate, widely spaced, straight to bent, 24 -



Figs 1 - 5. *Appendiculella mauensis*. 1. Hypha branching alternate at acute angles. 2. Ascus with two ascospores. 3. Ascospores. 4. Germinating ascospores. 5. Larviform appendages. Ch = Capitate hyphopodia, La = Larviform appendages, Ph = Phialides. Bar = 20 μm.



Figs 6 - 8. *Appendiculella rubi*. 6. Hyphae branching opposite or irregular at acute angles. 7. Ascospores. 8. Larviform appendage. Ch = Capitate hyphopodia, La = Larviform appendages, Ph = Phialides. Bar = 20 μm.

52 x 10 - 20 μm; head cell 1 - 2 lobate, 12 - 20 x 12 - 20 μm ; stalk cell 1 - 2 septate, cylindrical, straight to bent, 14 - 34 x 4 - 10 μm. Phialides mixed with capitate hyphopodia, alternate or linear, ampulliform, straight to bent, 14 - 24 x 4 -8 μm. Ascomata scattered, perithecioid, verrucose, 350 - 496 μm diam. Larviform appendages numerous, brown, transversely striate, tapering to recurved apex, obtuse, 42 - 108 x 20 - 36 μm. Ascospores 2 - 4 per ascus, 3 - septate, fusoid, obtuse, constricted, 44 - 66 x 16 - 20 μm.

Notes: *Appendiculella caseariicola* H. Hu on *Caseareia villimba* Merr. from China is the only other species of the genus described on this host. However, it has much smaller colonies (3 mm diam.), hyphopodia (28 - 32 μm long), ascomata (200 μm diam.), appendages (60 x 30 μm) and ascospores (40 - 46 x 14 - 17 μm) (Hu & Yang, 1989).

Appendiculella rubi R. K. Mibey sp. nov. Figs 6 - 8.
Etymology: *rubi* (Latin), in reference to the host species *Rubus keniensis*.

Plagulae epiphyllae, tenuis, ad 3 mm diam. Hyphae rectae, densae reticulatae, opposita vel alternata acuteque ramosae, cellulis 30 - 39 x 6 - 9 μm. Hyphopodia capitata alternata, recta vel curvata, 21 - 24 x 12 - 15 μm; cellula apicali globosa vel rotundatus angulata, integra vel leniter lobata, 12 - 15 x 15 μm, cellula basali cuneata vel cylindracea, 9 - 12 x 6 μm. Phialis et hyphopodia capitatis commixta, alternata, ampulliformis, 15 - 18 x 6 μm. Ascomata aggregata, verrucosa, 168 - 240 μm diam.; appendiculatus 6 - 9, brunneus, subcylindracea, transversus striatus, apex obtusae, 60 - 129 x 24 - 30 μm. Ascosporae 3 - septatae, oblongae, constrictae, 39 - 45 x 12 - 15 μm.

Holotypus: **Kenya**: Mau forest, in folii *Rubi keniensis* Standl. (*Rosaceae*), 15 Oct. 1990, leg. *R. K. Mibey*, 0115 NAI.

Colonies epiphyllous, thin, up to 3 mm diam. Hyphae straight, cells 30 - 39 x 6 - 9 μm, branching opposite or alternate at acute angles, closely reticulate. Capitate hyphopodia alternate, straight or bent, 21 - 24 x 12 - 15 μm; head cell globose to rounded angulose, entire to slightly lobed, 12 - 15 x 12 - 15 μm; stalk cell cuneate to cylindric, 9 - 12 x 6 μm. Phialides mixed with capitate hyphopodia, alternate, ampulliform, 15 - 18 x 6 μm. Ascomata in central group, perithecioid, verrucose, 168 - 240 μm diam. with 6 - 9 appendages, brown, subcylindric, transversely striate, apex obtuse, 60 - 129 x 24 - 30 μm. Ascospores 3 - septate, cylindric, obtuse, constricted, 39 - 45 x 12 - 15 μm.

Notes: *Appendiculella calostroma* (Desm.) Höhn. on *Rubus trivialis* from U. S. A. differs from this species by having larger ascospores (40 - 50 x 13 - 15 μm), phialides (14 - 24 x 12 - 20 μm) and capitate hyphopodia (20 - 40 x 12 - 20 μm), with the head cell rounded - angulose to irregularly and 3 - 6 lobate (Hansford, 1961).

Asteridiella aguariae (Hansf.) Hansf., Sydowia **10**: 46 (1957).
= **Irenina aguariae** Hansf., Proc. Linn. Soc. Lond. **158**: 30 (1946).

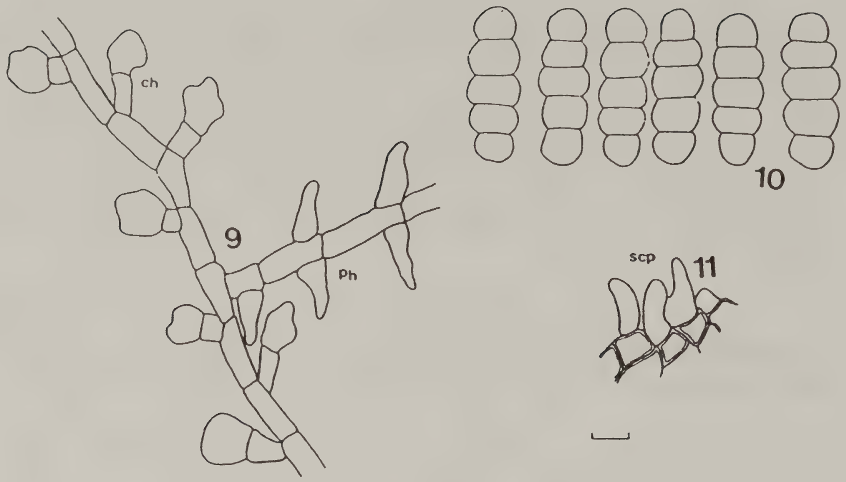
Colonies epiphyllous, subdense, up to 2 mm diam. Hyphae substraight, loosely reticulate, branching opposite at acute angles, cells 16 - 20 x 6 - 8 μm. Capitate hyphopodia alternate, antrorse, straight or bent, 18 - 21 x 8 - 12 μm; head cell subglobose to clavate, entire, straight, 12 - 18 x 8 - 12 μm; stalk cell cylindric to cuneate, 6 - 8 x 6 μm. Phialides opposite, separate from capitate hyphopodia, mostly on older hyphae, 20 - 26 x 8 - 10 μm. Ascomata few per colony (about five), perithecioid, verrucose, 108 - 200 μm diam. Ascospores 3 - septate, ellipsoid, obtuse, slightly constricted, 48 - 52 x 16 - 20 μm.

Kenya: Mau forest, on leaves of *Aguaria salicifolia* (Lam.) Oliv. (*Ericaceae*), Kenya, 20 Jan. 1991, *R. K. Mibey*, 0107 NAI.

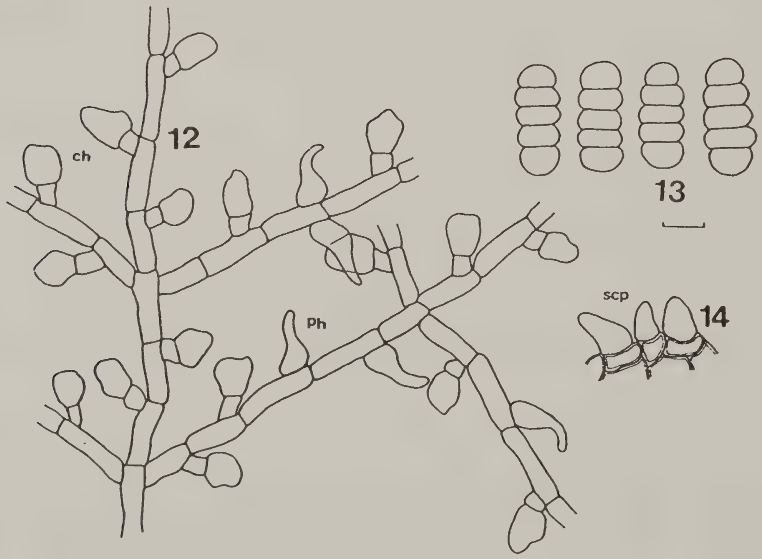
Notes: Although our fungus differs from the type of *Asteridiella aguariae* on *Aguaria salicifolia* from Zaire (Hansford, 1961) by somewhat longer hyphal cells (20 - 30 x 7 - 10 μm), longer hyphopodia (18 - 26 x 10 - 13 μm) and slightly larger ascospores (50 - 58 x 17 - 20 μm), it does not merit separation into a new species as the differences are not considered to be very significant.

Asteridiella mathengeiana R . K. Mibey sp. nov. Figs 9 - 11.
Etymology: *mathengeiana* (Latin), in honour of Mr Simon Mathenge of the Department of Botany, University of Nairobi, who helped in the identification of all the host species included in this study.

Plagulae epiphyllae, subdensae, ad 2 mm diam. Hyphae subrectae, alternatae vel irregulariter lateque ramosae, cellulis 21 - 27 x 9 - 12 μm.



Figs 9 - 11. *Asteridiella mathengeiana*. 9. Ascospores. 10. Hypha branching at wide angles. 11. Surface cells of perithecia. Ch = Capitate hyphopodia, Ph = Phialides, Scp = Surface cells of perithecia. Bar = 20 μm.



Figs 12 - 14. *Asteridiella trichocladi*. 12. Hyphae branching opposite at acute to wide angles. 13. Ascospores. 14. Surface cells of perithecia. Ch = capitate hyphopodia, Ph = Phialides, Scp = Surface cells of perithecia. Bar = 20 μm.

Hyphopodia capitata alternata, antrorsa, recta vel leniter curvata, 28 - 34 x 12 - 15 μm; cellula apicali subglobosa, ovata vel lobata, 18 - 22 x 12 - 15 μm, cellula basali cuneata vel cylindrica, 10 - 12 x 6 - 7 μm. Ascomata dispersa, verrucosa, 105 - 139 μm diam. Cellulae peritheciales conoideae, rectae vel curvatae ad apicem, ad 21 μm longae. Ascosporae 4 - septatae, cylindricae, obtusae, constrictae, 42 - 51 x 12 - 21 μm.
Holotypus: **Kenya**: Mau forest, in folii *Ehretiae cymosae* (*Boraginaceae*), 2 Dec. 1992, leg. *R. K. Mibey*, 0120 NAI.

Colonies epiphyllous, subdense, to 2 mm diam. Hyphae substraight, branching alternate or irregular at wide angles, 21 - 27 x 9 - 12 μm. Capitate hyphopodia alternate, antrorse, straight or slightly bent, 28 - 34 x 12 - 15 μm; head cell subglobose, ovate or lobed, 18 - 22 x 12 - 15 μm; stalk cell cuneate to cylindrical, 10 - 12 x 6 - 7 μm. Phialides opposite to irregular, ampulliform, 18 - 21 x 7 - 11 μm. Ascomata scattered, perithecioid, verrucose, 105 - 140 μm diam., surface cells obtusely conoid, apex straight or slightly bent, to 21 μm long. Ascospores 4 - septate, cylindric, obtuse, constricted, 42 - 51 x 12 - 21 μm.

Notes: Of the six species of *Asteridiella* described from species of *Boraginaceae* (Hansford, 1961; Hosagoudar *et al.*, 1994) only one species, *A. ehretiae* V.B. Hosagoudar (Hosagoudar *et al.*, 1994) has been found on the host genus *Ehretia*. This species differs from *A. mathengeiana* by having hypophyllous colonies with hyphae branching alternately to oppositely at acute angles, by ascomata lacking protruding conoid surface cells and by the smaller ascospores.

Asteridiella nuxiae Hansf., Sydowia **10**: 49 (1957).
= *Irene nuxiae* Syd., Bothalia **2**: 433 (1928).
= *Irenina nuxiae* (Syd.) Hansf., Proc. Linn. Soc. Lond. **157**: 174 (1946).

Colonies amphigenous, mostly epiphyllous, subdense, to 3 mm diam. Hyphae straight to undulate, closely reticulate, cells measuring 21 - 36 x 6 - 8 μm. Capitate hyphopodia alternate, antrorse, straight or bent, 16 - 20 x 10 - 12 μm; head cell subglobose to elongate, entire, straight, 10 - 16 x 10 - 12 μm; stalk cell cylindric to cuneate, 6 - 8 x 6 - 8 μm. Ascomata scattered, perithecioid, verrucose, 136 - 221 μm diam. Ascospores 4-septate, oblong to subellipsoid, obtuse, constricted, 40 - 44 x 16 - 20 μm.

Kenya: Mau forest, on leaves of *Nuxia congesta* (*Loganiaceae*), 20 Sep. 1990, *R. K. Mibey*, 0111 NAI.

Notes: The present collection agrees with the description given for *Asteridiella nuxiae* on *N. floribunda* from South Africa. Hyphal cell (15 - 30 x 5 - 8 μm), ascomata (220 μm) and ascospore (39 - 50 x 17 - 22 μm) dimensions are similar and colonies are amphigenous, hyphal branching is opposite and at acute angles, and the capitate hyphopodia are alternate (Hansford, 1961). This constitutes a new host record for *A. nuxiae* and is also the first report of this species from Kenya.

Asteridiella trichocladi R. K. Mibey sp. nov. Figs 12 - 14.
Etymology: *trichocladi* (Latin), in reference to the host species *Trichocladus ellipticus*.

Plagulae amphigenae, subdensae ad 8 mm diam. Hyphae plerumque rectae vel leniter undulatae, opposite lateque ramosae, laxe reticulate, cellulis 18 - 23 x 9 - 12 μm. Hyphopodia capitata alternata, antrosus, recta vel flexuosa, 18 - 27 x 12 - 15 μm; cellula apicali subglobosa vel leniter 1 - lobata, 15 - 18 x 12 - 15 μm; cellula basali cylindrica vel cuneata, 6 - 9 x 6 μm. Phialis et capitata commixta, pauci, opposita vel alternata, ampulliformia, 18 - 30 x 7 - 9 μm. Ascomata dispersa, pauca, verrucosa, 216 - 240 μm; ascosporae oblongae, 4 - septatae, constrictae, 42 - 49 x 12 - 21 μm.

Holotypus: **Kenya:** Mau forest, in folii *Trichocladi ellipticae* (*Hamamelidaceae*), 16 Nov. 1990, leg. *R. K. Mibey*, 0104 NAI.

Colonies amphigenous, subdense, up to 8 mm. diam. Hyphae mostly straight or slightly undulate, cells 18 - 23 x 9 - 12 μm; branching opposite at acute to wide angles, loosely reticulate. Capitate hyphopodia alternate, antrorse, straight or slightly curved, 18 - 27 x 12 - 15 μm; head cell subglobose to slightly 1 - lobate, 15 - 18 x 12 - 15 μm; stalk cell cylindric to cuneate, 6 - 9 x 6 μm. Mucronate hyphopodia few, mixed with capitate hyphopodia, opposite or alternate, ampulliform, 18 - 30 x 7 - 9 μm. Perithecia scattered, verrucose, few, 216 - 240 μm diam. Ascospores 4 - septate, oblong, obtuse, constricted, 42 - 49 x 12 - 21 μm.

Notes: *Asteridiella scabra* (Doidge) Hansf. (Hansford, 1961) is the only other species of *Asteridiella* described on *Trichocladus ellipticus* from South Africa. *Asteridiella trichocladi* differs from this species by its larger hyphal cells (20 - 35 x 10 - 15 μm), with irregularly rounded angulose to sublobate head cell of capitate hyphopodia (23 - 38 x 10 - 15 μm) and by its smaller ascospores (35 - 40 x 14 - 17 μm).

ACKNOWLEDGEMENTS

We are grateful to the Dean's Committee Research Fund, University of Nairobi and the National Council for Science and Technology of Kenya for providing grants towards this study. We also wish to thank Mr Simon Mathenge of the Department of Botany University of Nairobi for his assistance in the identification of some of the host species. Much appreciation goes to Drs A. Sivanesan and Paul M. Kirk, both of the International Mycological Institute, for their critical review of this manuscript and help with the Latin diagnoses.

REFERENCES

Gillet, J. B. and P. G. McDonald. 1970. *A numbered check-list of trees, shrubs and noteworthy lianes indigenous to Kenya*. Government Printer, Nairobi. 67 pp.

Hansford, C. G. 1961. The Meliolineae, a monograph. *Beihefte zur Sydowia* **2**: 1 - 806.

Hosagoudar, P. A. Raghu and C. M. Pillai. 1994. Meliolaceae of Southern India - XIV. *Nova Hedwigia* **58**: 529 - 543.

Hu, H. and J. C. Yang. 1989. Two new species and four new records of Meliolaceae from Guangdong, China. *Acta Mycologica Sinica* **8**: 86 - 90.

MYCOTAXON

Volume LVII, pp. 97-116 January-March 1996

THE GENUS *PHAEOCOLLYBIA* IN SOUTH EAST AUSTRALIA

BETTYE J. REES AND A.E. WOOD

School of Biological Science
The University of New South Wales, Sydney, 2052, Australia.

ABSTRACT

Four taxa of the genus *Phaeocollybia* are described from south east Australia. Two species *P. australiensis* and *P. ratticauda* and one variety *P. ratticauda* var *myrtaceophila* are found in association with dry fruited myrtaceous species in New South Wales. The remaining species *P. tasmanica*, (previously recorded as *P. ratticauda)*, is found in association with *Nothofagus* forest in the island state of Tasmania. Together they represent the first fully described species of *Phaeocollybia* from Australia and the first recorded from the Australian mainland. Examination of Australian collections confirms the presence of caulocystidia in all taxa. In addition, capitate pileocystidia are present on the epicuticular hyphae in all cases, a feature not yet recorded for other species world-wide.

Key words: *Phaeocollybia*, Agaricales, Cortinariaceae, FESEM, Australia, mycogeography.

INTRODUCTION

The basidiomycete genus *Phaeocollybia* Heim is generally regarded as rare (Smith,1957; Redhead & Norvell,1993). The distribution of species is thought to be closely related to forest types (Redhead & Malloch,1986) with many of the same species occuring throughout boreal forests of the northern hemisphere in North America (Smith,1957), Europe (Moser,1983), far-eastern Russia (Nezdoyminogo,1990) and Japan (Imazeki & Hongo,1981). However, it is in the old growth coniferous forests of north west America that the genus shows its greatest species diversity (Singer,1970; Horak,1974; Redhead & Norvell,1993). The discovery of new species associated with broad leaved hosts such as *Quercus* and *Nothofagus* spp has extended the known area of distribution of *Phaeocollybia* to pantropical and subtropical areas in central America (Singer,1970,1987; Horak & Halling,1991), India (Horak,1974), and south-east Asia (Horak,1977), as well as to cool temperate zones in the southern hemisphere such as Bolivia (Singer,1961) and New Zealand (Horak,1973,1977). Mexico, with its mix of northern dominated conifer and southern hemisphere broad-leaved species now rivals the Pacific north west of North America for species diversity with 17 species described (Guzmán, Bandala-Muñoz & Montoya-Bello,1987; Bandala-Muñoz, Guzmán & Montoya-Bello,1989; Bandala, et al 1994) bringing the total of species described world-wide to around fifty, a healthy total for a genus regarded as rare. Planned revision of north American taxa will probably extend the number of known species even further (Redhead and Norvell,1993).

The biological status of *Phaeocollybia* as a parasite, a saprophyte on buried wood, or as a mycorrhizal symbiont has been the subject of some speculation (Smith,1957; Singer,1970; Horak,1977). It has been recently demonstrated that *P. christinae* (Fr.)Heim is a root parasite on *Picea sp.* in eastern Canada (Redhead & Malloch,1986). Whether this nutritional mode is common to all species has yet to be determined. In any event, either as a weak parasite or mycobiont, the genus seems to be host specific. In the southern hemisphere, its distribution has been linked to that of the old Gondwanan genus *Nothofagus* (Horak,1973; Horak & Halling,1991), which is present in association with southern hemisphere conifers in S. America, Australia, New Zealand, New Caledonia and New Guinea. Despite the fact that the area is well explored (Singer,1987) no species of *Phaeocollybia* have been described south of Bolivia in S. America where they occur in *Quercus* dominated forests (Singer,1961). Five species have been reported from Brazil on soil in leaf litter (Singer,1987) with no information about host identity, but none from the *Nothofagus* forests of southern S. America (Garrido,1985; Horak,1979; Raithelhuber,1987). Three species have been described from New Zealand which occur in association with *Nothofagus*. One of these, *P. ratticauda* Hk., was also collected from pure stands of *Leptospermum* spp near Auckland (Horak,1983). This species has also been described from New Guinea (Horak,1977).

Although the genus *Phaeocollybia* has been reported to occur in association with *Eucalyptus* spp, (Horak,1977;1991), only one species of doubtful identity, *P. primulinus* (Berk.)Hk. has been recorded from mainland Australia (Horak,1977). However, recently *P. ratticauda* Hk., originally described from New Zealand, was pictured from rainforest in Tasmania, Australia (Fuhrer & Robinson,1992) where *Nothofagus* is also present.

In the field, the genus *Phaeocollybia* Heim can be distinguished from other genera within the agaric family Cortinariaceae by its tough, frequently radicating stipe without a cortina, and the moist to viscid surface of the cartilaginous, conic to campanulate pileus. With age the pileus tends to become plane, often with a broad central umbo. The characters of the genus have been extensively documented (Smith,1957; Singer,1970 and Horak,1977). Vivid colours, especially purple, are not uncommon in the lamellae and stipes of young basidiomata, a feature shared with other members of the Cortinariaceae especially *Gymnopilus, Pyrrhoglossum* and *Cortinarius* itself. At maturity these colours are frequently lost, thereby reducing their taxonomic value. It is for this reason that basidiomata need to be collected at all stages of development, a none too simple task in the case of *Phaeocollybia* which is so rarely encountered. In the basically dry climate of mainland Australia, cap viscidity is less obvious in this and other genera such as *Cortinarius*, and is only readily observed after rainfall.

Recently, caulocystidia have been observed below ground level on stipes of several north American species (Redhead & Malloch,1986; Redhead & Norvell,1993). This has been confirmed for European species by Laber (1991) suggesting the feature is probably a generic character.

The shape and colour of the basidiome together with spore morphology are important characters for species identification. In addition cheilocystidia shape is used for identification and to split the genus into sections (Singer,1970; 1987). Variations in spore ornamentation are more readily observed in scanning electron micrographs and the Field Emission Scanning Electron Microscope (FESEM) with its close working distance is particularly suited for this purpose.

This work on *Phaeocollybia* has arisen as a result of attempts to define the boundaries of the genus *Gymnopilus* in S.E. Australia. Some collections of *Gymnopilus* from this area have features in common with other Cortinariaceous genera such as *Phaeocollybia* and *Pyrrhoglossum* (Rees, ined). Finely ornamented, small spores and fusoid capitate cheilocystidia can be found in all three genera. A more comprehensive comparison of these and other features will be undertaken in subsequent publications on the respective genera.

MATERIALS AND METHODS

Dried fungal tissue was rehydrated in 5% aqueous KOH to observe colour of tissue and spore size. 1% aqueous Congo Red was later added to these preparations to enhance contrast for examination and drawing. Spores were measured in lateral profile from lamellae fragments mounted in 5%KOH to observe colour and ornamentation and in Melzer's reagent for comparison of colour reaction with other Cortinariaceous genera. Measures stated in brackets are for total number of spores measured / number of basidiomata examined in total / number of different collections examined. The measurements do not include the spore ornamentation or apiculus. Hand cut tranverse sections of lamellae were examined for pleurocystidia as these structures can often be overlooked in squashes. Colour notation is from Maerz & Paul (1930).

Field emission scanning electron microscopy (FESEM) was carried out on dried herbarium lamellae fragments which were rehydrated in a graded acetone series, fixed overnight in 2.5% glutaraldehyde, rinsed in buffer, osmicated and subsequently dehydrated after the method of Cheesman & Grund (1985). Because potassium rather than sodium ions occur commonly in fungal tissue, potassium phosphate buffer (0.025M) at pH 6.8 was used in place of Sorenson's buffer as a rinsing solution. The fragments were then critical point dried from acetone in a Jumbo Polaron critical point dryer and mounted on copper strips. The strips were sputter coated using a gold/paladium target in a Polaron sputter-coater Model E5000 and examined in a Hitachi S900 Field Emission Scanning Electron Microscope (FESEM) at 5kV accelerating voltage. Spore size measurements taken from electron micrographs are smaller in value than those obtained from light microscopy because of the effects of tissue processing and angle of tilt during examination.

RESULTS

Key to Australian species.

1. Spores limoniform, 9.0-12.6 µm, pileus buff coloured, stipe and lamellae with purple colours to maturity, stipe base gradually tapering. ***P. australiensis***

***1**. Spores ovoid to subspherical < 7.0 µm, pileus tan to chestnut, stipe apex and lamellae variable in colour, stipe base variable in shape. **2.**

2. Stipe base abruptly radicating, pileus burnt orange to tan. Presence of purple colours variable. **3.**

  3. Pileus tan buff to dark tan, purple colour present in stipe apex and lamellae, plage visible in light microscopy, pleurocystidia numerous. ***P. ratticauda***

  3**. Pileus burnt orange in colour, purple colours absent at all stages of maturity, plage not visible in light microscopy, pleurocystidia sparse to lacking. ***P. ratticauda var ***myrtaceophila***

2**. Stipe base more gradually tapering, purple colour present in stipe apex and lamellae, spores more elongate, mid melleous in KOH, cystidia with abruptly narrowing necks born on inflated sub-cystidial cells. ***P. tasmanica

Species descriptions

1. *Phaeocollybia australiensis* Rees and Wood, *sp. nov.*

Fig. 1. A-F.
Plate 1. Nos. 1&2.

Pileus 45-70 mm latus, convexus dein planus vel leviter reflexus, umbone parvo latoque instructus; obscure bubalinus dein brunneo bubalinus; glaber, siccus. Lamellae adnexae, malvinae dein ferrugineae. Stipes usque ad 110 x 7-11 mm, radicatus, omnino malvinus. Sporae 9.0-12.6(-14.1) x 5.1-6.6(-7.2) µm, limoniformes, minute verrucosae, pallide melleae. Cheilocystidia 18-35 x 4-7 µm, fusiformia, capitulo globoso 1-2 µm diametro instructa.

Holotypus: Australia, New South Wales, Canyonleigh, on soil in dry sclerophyll forest, 16th April 1990, *R. J. King,* UNSW 90/133.

Pileus 45-70 mm in diameter, convex becoming plane to slightly reflexed with a slight umbo; dull buff to buff brown (13-14C9); smooth, dry, not radially fibrillose or pellucid striate. Context < 7 mm deep. *Lamellae* < 7 mm deep, adnate, thin, crowded, pale mauve at first then dull ferruginous, margin concolorous; 1-2 sets of lamellulae. *Stipe* 95-110 x 7-11 mm, central, tough, rooting but not abruptly tapering, with a cartilaginous cortex and stuffed interior, smooth, dry; exterior and rind mauve throughout (46E4 - 54B5), base pallid tan, stipe flesh white; no velar remains. *Odour* not recorded fresh, not distinctive dried. *Taste* not recorded fresh, nutty dried.

Chemical tests: 5% KOH on pileus surface darkening to light chestnut but no black colour developing. No diffusing pigment when gill fragment mounted in 5% KOH.

Basidiospores [30/3/1] 9.0-12.6 (-14.1) x 5.1-6.6 (-7.2) ($\bar{x}$=11.0±1.46 x 6.1±0.6) µm, Q = 1.76, elongate, light melleous, inamyloid, limoniform with a pronounced mucronate apex, very faintly punctate, some thinning of the wall at the apex, but no germ pore or plage. *Basidia* 22-38 x 7-8 µm, clavate, 4-spored (occasionally 3-spored), hyaline. *Cheilocystidia* 18-35 x 4-7 µm, fusoid-ventricose with a tapering narrow neck surmounted by a capitellum 1-2 µm in diameter, hyaline. *Pleurocystidia* present, similar to cheilocystidia. *Hymenophoral trama* subparallel, consisting of hyaline, thin walled, cylindrical cells 3.5-8.0 µm in diameter sometimes inflated at one end. *Caulocystidia* capitate 3-12 x 1-2 µm, filamentous with a swollen capitellum 1-2 µm in diameter, very numerous below soil level at the base, sparse in the middle and moderate at the apex of the stipe. *Pileipellis* an ixocutis, the outer layers of which are composed of radially parallel, narrow hyphae 2.8-4.8 µm in diameter which are lightly gelatinised and occasionally uplifted and interwoven. The innermost layers of the epicutis are also gelatinised and pigmented plasmatically. The hypodermium consists of a narrow layer of lightly pigmented, cylindrical,

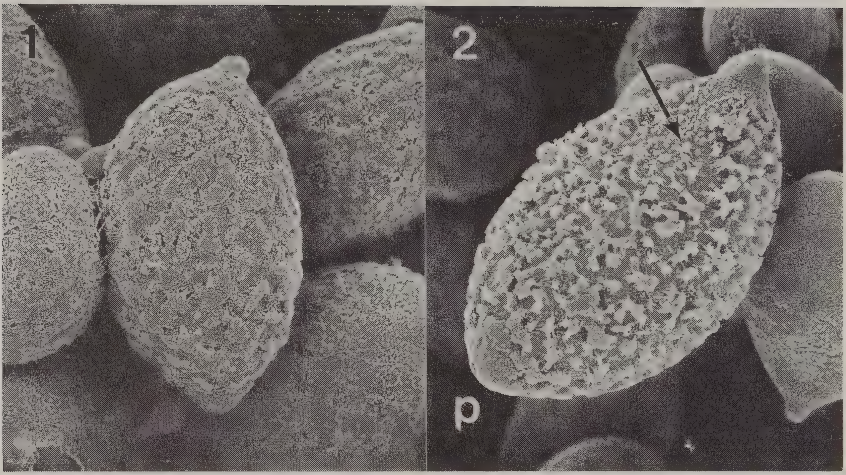


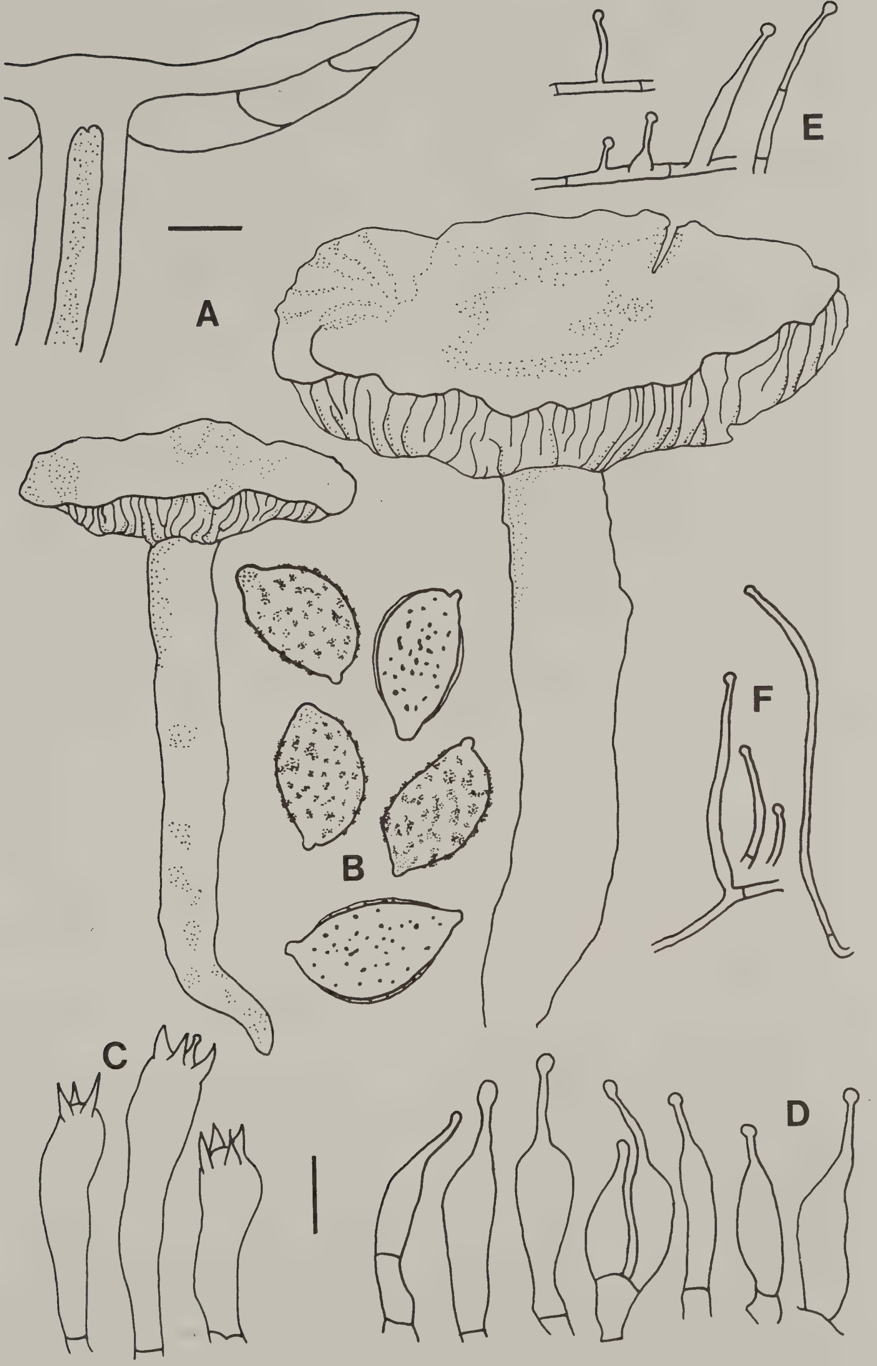
Plate 1. Field Emission Scanning Electron Micrographs (FESEM) of basidiospore surfaces of ***Phaeocollybia australiensis*** 90/133 (holotype) showing changes in ornamentation with maturity. **1**. Perisporium layer has almost disappeared and ornamentation pattern is emerging. At this stage many basidiospores are shed. **2.** A fine, discreet, low pattern of ornamentation has emerged with a barely detectable lowering of ornamentation at the supra-apicular depression (arrow). This is not visible in light microscopy. Small remnants of perisporium (p) remain at the apex of the basidiospore. Only large cells which are usually found in most preparations show this type of ornamentation. Magnification throughout x 8,000.

inflated cells 8-18 µm in diameter which are increasingly interwoven before grading into the pileus tramal hyphae. Extremely long, filamentous, capitate pileocystidia 60-100 x 2-3 µm arise from the sides and at the ends of the gelatinised hyphae and occasional oleiferous hyphae are present in the hypoderm. No clamp connections seen in any tissues. Scanning electron micrographs of basidiospores (Plate 1. Nos. 1&2) reveal a fine, discreet ornamentation once the perisporium is lost, with a small area of lowered ornamentation at the supra-apicular depression which is not visible in light microscopy.

Growth habit and habitat: Singly on the ground in dry sclerophyll forest dominated by *Eucalyptus* spp growing in association with *Leptospermum spp* especially *Leptospermum polygalifolia* Griseb.

Distribution: Australia.

Fig. 1. (At right) ***Phaeocollybia australiensis*** UNSW 90/133 (holotype): A. basidiome, B. basidiospores, C. basidia, D. cheilocystidia, E. caulocystidia, F. pileocystidia. Scale bar = 1 cm for A, 5 µm for B, 10 µm for C, D, & E. and 20 µm for F.


A
B
C
D
E
F

Material examined: AUSTRALIA. New South Wales: Canyonleigh, 16th April 1990, *R. J. King* UNSW 90/133 (holotype).

P. australiensis is characterised by purple colourations in stipe and lamellae and has fusoid to ventricose-rostrate capitate cheilocystidia similar to *P. ratticauda* Hk. However, *P. australiensis* can be readily distinguished from *P. ratticauda* by its larger stature, paler cap colour, persistently pinkish-mauve lamellae and microscopically by its large, elongate, limoniform spores with a distinct mucronate apex, the slightly larger more gently sloping neck section in the cheilocystidia, and a pseudorhiza which has a more pointed, less abruptly tapering base. These characters place *P. australiensis* in *Phaeocollybia* Sect. *Versicolores* (Singer, 1986, 1987).

P. singularis Horak & Halling from Colombia also has lilac colours, sublimoniform spores and fusoid capitate cheilocystidia but can be differentiated from *P. australiensis* by its smaller, darker pileus and its smaller and less conspicuously roughened spores. In this sole collection, *P. australiensis* is a strikingly beautiful species at maturity with its large stature and brightly coloured mauve stipe and lamellae beneath a buff coloured reflexed pileus. The area from which it was collected is a frequently logged, dry eucalyptus forest with a shrubby understorey in which other myrtaceous species are to be found, particularly *Leptospermum spp*, a very different vegetation type from that usually associated with the occurrence of this genus in other parts of the world. Further collections are needed to better characterise the appearance of young basidiomata and for details of odour and taste in the fresh state.

2. ***Phaeocollybia ratticauda*** Horak

Nova Hedwigia Beihefte **43**, 183-191 (1973).

Fig. 2. A-G.
Plate 2. No 3.

Description of Australian collections.

Pileus 18-35 mm, conical to convex, then plane to reflexed, often with a broad central umbo; circular; tan buff to dark tan (6F12 to 6E12), margin a little paler and entire with no velar remains; smooth or covered with fine, slightly uplifted, pale buff scales, dry to slightly viscid, occasionally hygrophanous. Context dirty cream to white, up to 6mm thick at the disc. *Lamellae* very narrowly adnexed to almost free, very crowded, thin, 2-5 mm wide; dull cream to pallid, dull ferruginous to pallid purple, margin concolorous; 3-4 sets of lamellulae. *Stipe* 20-50 x 4-7 mm, equal, central with a distinct, fine, abruptly radicating base in most cases; circular, dry, smooth with a few scattered, concolorous hairs; pale cap coloured at base, frequently purplish at the apex becoming dull reddish buff to purplish throughout with age; stipe flesh watery, greyish white, bluish purple above, cartilaginous, hollow. No velar remains. *Odour* of dried fruit bodies like Thai fish sauce or burnt hair present in some collections. *Taste* nutty to raphanoid in dried material.

Chemical tests: 5% KOH on pileus darkens to chestnut but not black. No pigment diffusing from lamellae fragments in 5% KOH.

Basidiospores [60/6/6], (4.8-) 5.1-6.9 x 3.5-4.8 ($\bar{x}$ = 5.31±0.24 x 3.9±0.27) µm, Q = 1.36, pip shaped, verruculose, with a small plage but no germ pore, light melleous, inamyloid. *Basidia* 18-26 x 5-6 µm, narrowly clavate, 4-spored. *Cheilocystidia* 15-24 x 3-4 µm, sub-fusoid with a finely tapering, occasionally off-centre neck surmounted by a small capitellum 1-2 µm in diameter, hyaline, thin walled, numerous. *Pleurocystidia* present, the majority similar to the cheilocystidia; in addition some utriform to filiform shapes also present of similar length, but a little wider. *Tramal hyphae* composed of hyaline, cylindrical, slightly inflated, large cells 8-13 µm in diameter interspersed with narrower cells 2-6 µm in diameter. *Caulocystidia* capitate, 6 µm long, cylindrical with a capitellum 1 µm in diameter, hyaline, occurring infrequently on the sides of hyphae below ground level only. *Pileipellis* a cutis composed of radially parallel, pigmented, cylindrical hyphae 1.8-6.2 µm wide with light rusty encrustations, here and there uplifted to form small tufts. Some of these hyphae terminate in, or bear laterally, narrow, hyaline, capitate (1 µm) pileocystidia which project from the intact cuticle surface in many cases. Slight gelatinisation is present. In mature basidiomata occasional oleiferous hyphae separate the cuticle from the hypoderm in which the cylindrical cells are also pigmented and radially parallel, but thick walled and much inflated (9.7-15.8 µm in diameter). Beneath this layer, and also separated from it again by oleiferous hyphae in mature basidiomata, is a much wider layer of loosely interwoven cells which grade into the radially parallel, narrower tramal hyphae. Clamp connections were absent from all these hyphae. Scanning electron micrographs of basidiospores (Plate 2, No 3) reveal an interconnected, slightly raised ornamentation which is distinctly lowered at the supra-apicular depression. This area can also be seen in light microscopy.

Habit and habitat: Scattered on soil in dry and wet sclerophyll and rain forest in which *Eucalyptus* is dominant.

Distribution: Australia, New Guinea, New Zealand (type).

Material studied: AUSTRALIA. New South Wales: Bateman's Bay, Kioloa State Forest, 19th May 1983, *A.E.Wood & J.J.Bruhl,* (UNSW 83/778); Jamberoo, Barren Grounds Bird Observatory, 11th April 1987, *A.E.Wood et al.*, (UNSW 87/36); Dungog, Chichester State Forest, 24th April 1993, *F. Taeker* (UNSW 93/33). NEW ZEALAND: Greymouth, Lake Hochstetter, 29th March, 1968, *E.Horak* (PDD 27098) holotype.

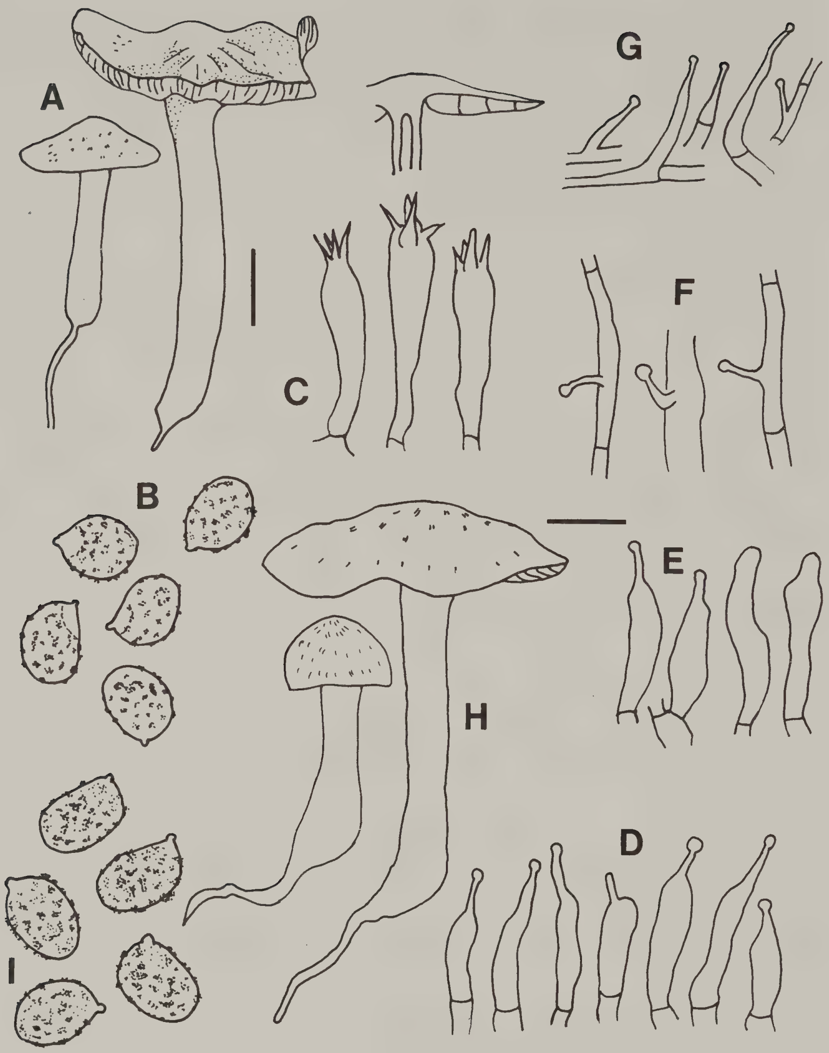


Fig. 2. ***Phaeocollybia ratticauda*** Hk. UNSW 93/33: A. basidiome, B. basidiospores, C. basidia, D. cheilocystidia, E. pleurocystidia, F. caulocystidia, G. pileocystidia. ***Phaeocollybia ratticauda*** var ***myrtaceophila*** 94/53 (holotype): H. Basidiome, I. basidiospores. Scale bar = 1 cm for A & H, 5 µm for B and I, 10 µm for C, D, E, F&G.

Of the species described as having purple colourations in lamellae or stipe at some stage in their development, *P. ratticauda* Hk. lies close to *P. rancida* Hk. from India, from which it can be distinguished by its pileus shape, abruptly tapering pseudorhiza, smaller spore size and differently shaped cheilocystidia. Microscopically *P. ratticauda* is very similar to *P. caudata* Hk. & Halling from Colombia and *P. querqueti* Corner & Horak from North Borneo. *P. caudata* posesses an abruptly tapering pseudorhiza, small spores and capitate cheilocystidia but has a differently shaped and coloured pileus from P. ratticauda, whereas the spores of *P. querqueti* are smaller, the pseudorhiza is tapering rather than abruptly radicating, and the taste and smell are reported to be soapy (Horak 1991).

In most respects the Australian collections approximate very closely to Horak's original description (1973) of *P. ratticauda* from New Zealand. Purple colour is present in the upper portion of the stipe and in the lamellae of most collections (more so at maturity in our case) as well as in the stipe flesh. There is some variability in the shape of the base, but in most cases the stipe ends in an abruptly radicating tail. There is also some variation in the pileus surface with most Australian collections showing small, fibrillar, buff coloured scales. In water-soaked collections scales are sparse, and the surface of the pileus appears hygrophanous. Scales are not present in the type species due, perhaps, to weathering. Microscopically, the major differences from the type as described are the presence of numerous pileocystidia and pleurocystidia similar to the cheilocystidia. These are less obvious on the cap in some cases but are borne both terminally and laterally on the hyphae. Once the tissue has been pressed out, pileocystidia are quite numerous even in mature caps. In addition, caulocystidia have been found on all collections. Re-examination of the New Zealand type collection reveals numerous pleurocystidia, sparse pileocystidia and caulocystidia. The upper limit of the spore size range lies just beyond 6.5 μm, placing the species intermediate between Sections *Microsporae* and *Versicolores* (Singer,1987).

In collections initially identified as *P. ratticauda* small variations occur in cap colour, size and shape of spores and shape of cheilocystidia. So few collections are available for examination that this may simply be ascribed to infraspecific variation until such time as sufficient data are available to support the erection of new taxa. However, differences in spore shape taken in conjunction with other characters are, in our view, significant enough to support the creation of the following variety.

3 ***Phaeocollybia ratticauda*** var ***myrtaceophila*** Rees & Wood, var. nov.

Fig. 2 H-I
Plate 2. No. 4.

Pileus 13-40 mm latus, campanulatus dein obtuse convexus, ambusto-aurantiacus; squamulosus, subgelatinosus. Lamellae subliberae vel liberae, cremeae dein ferrugineae. Stipes usque ad 60 x 4-7 mm, radicatus, sursum pallide basim versus

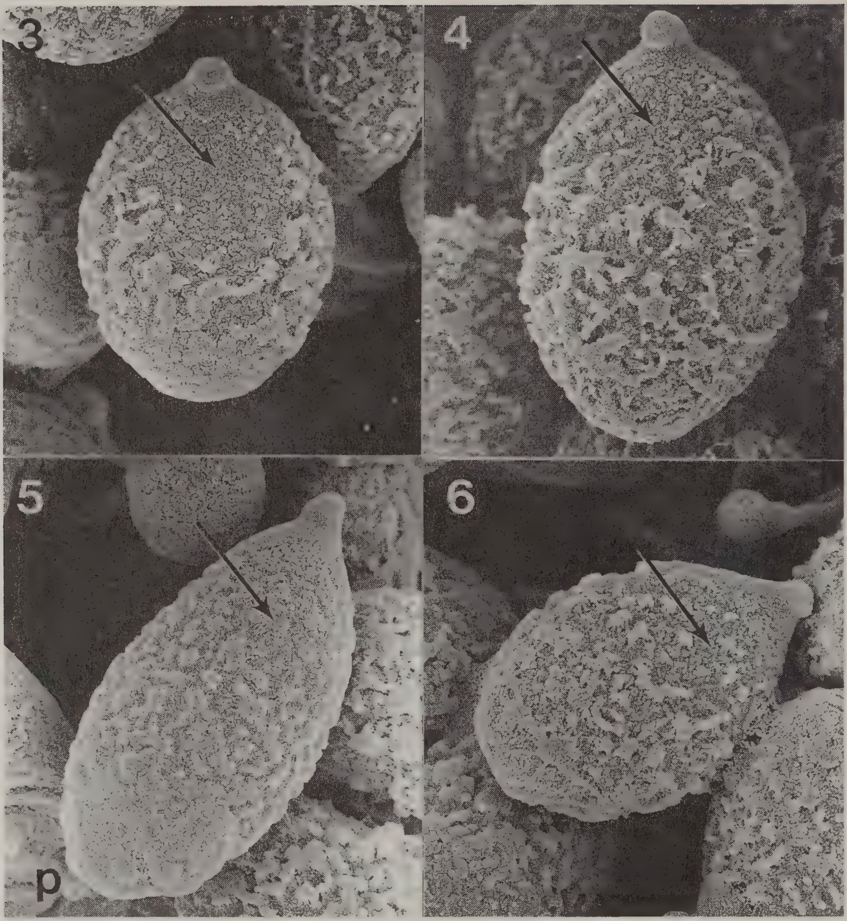


Plate 2 Field Emission Scanning Electron Micrographs (FESEM) of basidiospore surfaces. **3.** ***Phaeocollybia ratticauda*** PDD 27098 (holotype) has a low broad surface ornamentation with a pronounced area of lowered ornamentation at the supra-apicular depression which is clearly visible in light microscopy. **4.** Basidiospores of ***P. ratticauda*** var ***myrtaceophila*** UNSW 94/53 (holotype) which are a little larger, have a higher ornamentation and only a small area of lowered ornamentation (arrow) at the supra-apicular depression which is not visible in light microscopy. **5**. Surface of an immature basidiospore of ***Phaeocollybia tasmanica*** HO 124696 (holotype) showing characteristic elongate shape, perisporial remnants (p), and a low broad pattern of ornamentation which is not lowered appreciably at the supra-apicular depression (arrow). **6**. A mature basidiospore selected from the same lamellae fragment in which all traces of perisporium have disappeared and only a slightly lowered area of ornamentation is present near the supra-apicular depression (arrow). Magnification throughout x15,000.

aurantiacus pileum concolor. Sporae 5.7 - 6.3(-6.9) x 4.0 - 4.8 µm. Cheilocystidia versiformia, ventricosa vel fusoidia capitulo 1-2 µm instructo.

Holotypus: Australia, New South Wales, Springwood, Sassafras Gully. On soil in wet sclerophyll forest, 16th April 1994, *B.J. Rees & A.E.Wood*, UNSW 94/53.

Pileus 13-40 mm, campanulate to low convex with a broad central umbo; margin broadly undulating to reflexed in places; burnt orange (5A12-13B12), margin a little paler; dull, smooth, moist to slightly viscid, hygrophanous but not pellucid striate; finely radially fibrillose (under a hand lens), with fine, pale buff, slightly uplifted, tomentose scales confluent at the disc, more discreet at the margin; context dull, watery cream, 5 mm deep. *Lamellae* free but very close to stipe apex, very crowded, thin; margin concolourous, a little serrulate; pale cream becoming light tan to rusty tan; 3 sets of lamellulae with occasional anastomoses. *Stipe* 20-60 x 4-7 mm at the apex; variable in shape, mostly slightly enlarged at the base, before abruptly radicating; central, circular, smooth with a few scattered dark orange hairs especially towards the base; light creamy tan at the apex, more cap coloured below; tough, cartilaginous, hollow; stipe flesh pale watery cream, darker at base; no velar remains. *Odour* like peanuts. *Taste* nutty to raphanoid.

Chemical tests: 5% KOH on pileus darkens to chestnut but not black. No pigment diffusing from lamellae fragments in 5% KOH.

Spore print : dull rusty brown.

Basidiospores (50/5/2), 5.7-6.3(-6.9) x 4.0-4.8 ($\bar{x}$ = 6.22±0.35 x 4.31±0.18) µm, Q = 1.44, obovoid to pip shaped, verruculose, no plage or germ pore in light microscopy, melleous, inamyloid. *Basidia* 22-24 x 5-7 µm, clavate, 4-spored (some 2 or 3-spored). *Cheilocystidia* 17-30 x 2-5 µm, versiform, predominantly ventricose to fusoid with a capitate apex 1-2 µm in diameter surmounting the very narrow neck section, some filiform to utriform shapes as well, thin walled, numerous. *Pleurocystidia* sparse to absent. *Tramal hyphae* parallel, of long cylindrical cells 2.5-8 µm in diameter. *Caulocystidia* capitate, 15-20 µm, cylindrical with a capitellum 1-2 µm, borne terminally or laterally below ground level and also present at apex and mid stipe. *Pilleipellis* a cutis composed of radially parallel, pigmented, cylindrical hyphae 2.6-4.4 µm with rounded to swollen ends, surmounted by an epicutis of tangled to upright hyphae with numerous, occasionally pigmented cystidia born both laterally and terminally. These are cylindrical in shape, 10-25 x 1-2 µm, with a capitate apex 1-2 µm. Some slight gelatinisation is present in the epicutis. Most intracellular pigment is to be found in the bottom layers of the cutis and the hypoderm. This consists of inflated cells 7-10 µm in diameter and is separated from the interwoven tramal hyphae by occasional oleiferous hyphae. No clamp connections were observed in any tissues. Scanning electron micrographs of basidiospores (Plate 2 No. 4) show a discrete, conspicuous ornamentation with very little lowering at the supra-apicular depression which is not visible in light microscopy.

Habit and habitat: In troops on soil near the base of dry fruited myrtaceous species such as *Syncarpia glomulifera* (Sm.)Nied., *Backhousia myrtifolia* Hook. f. &

Harvey and *Tristaniopsis collina* Peter G. Wilson & Waterhouse in wet sclerophyll forest.

Distribution: Australia.

Material studied: AUSTRALIA: New South Wales: Canyonleigh, 25th March 1990, *R.J.King*, (UNSW 90/91); Springwood, Sassafras Gully, 16th April 1994, *B.J.Rees & A.E.Wood,* (UNSW 94/49, UNSW 94/51 and UNSW 94/53 [Holotype]).

The combination of an abruptly tapering pseudorhiza, obovoid to pip-shaped spores and fusoid-capitate cheilocystidia places *P. ratticauda* var *myrtaceophila* closest to *P. ratticauda* Hk. and *P. caudata* Hk. & Halling neither of which are described as having a scaley pileus. The paler, burnt orange colour and total absence of purple colouration at all stages of development further distinguish the two varieties although microscopically they are very similar. However, the surface ornamentation of the basidiospores in *P. ratticauda* var *myrtaceophila* is higher and more discreet and the plage smaller. In addition, pleurocystidia (which are numerous in *P. ratticauda*), are sparse or totally absent. There is no smell of burnt hair in any collections. *P. caudata* (Hk. & Halling) is much closer to *P. ratticauda* var *myrtaceophila* in colour, but has a wider stipe, a conic to obtuse papilla on a pileus which later develops red brown spots at maturity and lacks scaliness. The upper limit of the spore size range lies just beyond 6.5 µm placing the variety intermediate between Sections *Microsporae* and *Versicolores* (Singer,1987).

4. ***Phaeocollybia tasmanica*** Rees & Wood sp. nov.

Illustration: Fuhrer, B. & Robinson, R. Rainforest fungi of Tasmania and S.E. Australia. p55 (1992).

Fig. 3. A-G.
Plate 2. Nos. 5&6.

Pileus 25-40 mm latus (in statu sicco), late convexus, margine incurvata dein aliquantum reflexo, castaneo-brunneus, hygrophanus. Lamellae adnexae vel subliberae, lilacinae dein brunneus. Stipes centralis, basi bulbosus tum paulo attenuiti, castaneo-brunneus. Sporae 6.3-6.6 (-6.9) x 3.9-4.5 µm, medio-melleae, primo oblongae dein ellipsoideae, verruculosae. Cheilocystidia versiformia, ventricosa vel fusiformia capitulo 1-2 µm diametro instructa.

Holotypus: Australia. Tasmania, Ringarooma, Mount Victoria, Ralphs Falls, 16th May 1990, *R. Robinson & B. Fuhrer*, HO124696 type.

Macroscopic description compiled from illustration (*loc. cit.*) and dried fruit body characters.

Pileus 25-40 mm in the dried state, broadly convex, circular, margin entire at first, but splitting radially with age, no velar remains, inrolled at first becoming slightly recurved at maturity; chestnut brown with a brown margin; dull, moist, hygrophanous; no obvious scales. *Lamellae* adnexed, crowded, thin, lilac, becoming brown at maturity; three sets of lamellulae. *Stipe* central, "bulbous" or swollen at base, then tapering gradually to a long radicating tail; probably hollow; exterior chestnut brown throughout; no velar remains. *Odour* not recorded. *Taste* nutty, not at all bitter in the dried state.

Chemical tests: 5% KOH on pileus surface darkens to chestnut but not black. No pigment diffusing from lamellae fragments in 5% KOH.

Basidiospores [30/3/1] 5.3-6.9 x 3.6-4.5 ($\bar{x}$ = 6.2±0.5 x 4.0±0.3) µm, Q = 1.57, elliptical to pip shaped, verruculose, no germ pore or plage, warm melleous, inamyloid. *Basidia* 18-21 x 4-6 µm, hyaline, small and narrowly clavate with a broad base, 4-spored. *Cheilocystidia* 15-25 x 3-5 µm, hyaline, cylindrical, with an abruptly tapering, short, narrow neck section terminating in a small capitellum 1-2 µm in diameter. Many of these cheilocystidia appear to be septate at first, but are born on slightly inflated, sub-cystidial cells from which they are separated without branching by a simple septum. Forking and asymmetrical cheilocystidia are also present (Fig. 3 D), and there is an area at the apex of many which will not take up Congo Red. *Pleurocystidia* numerous, capitate, like cheilocystidia. *Hymenophoral trama* sub-parallel, consisting of long, hyaline, thin walled, hyphae 1.8-7.0 µm in diameter. *Caulocystidia* short 1.5-5 x 1 µm, peg shaped with tiny caputs, 1-2 µm, arising from the sides of the hyphae below ground level only. *Pilleipellis* a cutis composed of encrusted hyphae in which no gelatinisation is evident, separated from a wide, darkly pigmented hypoderm by occasional oleiferous hyphae. Capitate, cylindrical pileocystidia 5-10 x 1-2 µm are present, but sparse. Other hyphae have broadly clavate endings. No clamp connections are present in any tissues. FESEM of basidiospores reveals the presence of elongate immature forms (Plate 2. No 5), and the area of lowered ornamentation near the supra-apicular depression is small at maturity (Plate 2 No. 6). This is not visible in light microscopy.

Habit and habitat: Recorded as growing "on a *Nothofagus cunninghamii* log" in callidendrous forest (Fuhrer & Robinson,1992). The log appears to be partly covered by soil in the accompanying illustration.

Distribution: Australia.

Material studied: AUSTRALIA. Tasmania: Ringarooma, Mount Victoria, Ralphs Falls, 16th May 1990, *R. Robinson & B. Fuhrer,* HO 124696 (holotype).

This is the voucher collection which figures in the photograph by Fuhrer & Robinson (1992). *P. tasmanica* lies very close to P. *ratticauda* Hk. both macro and microscopically. In the absence of a good field character description, but working from a very good photograph, *P. tasmanica* is seen to have a moist, but not viscid pileus of a slightly darker colour than that

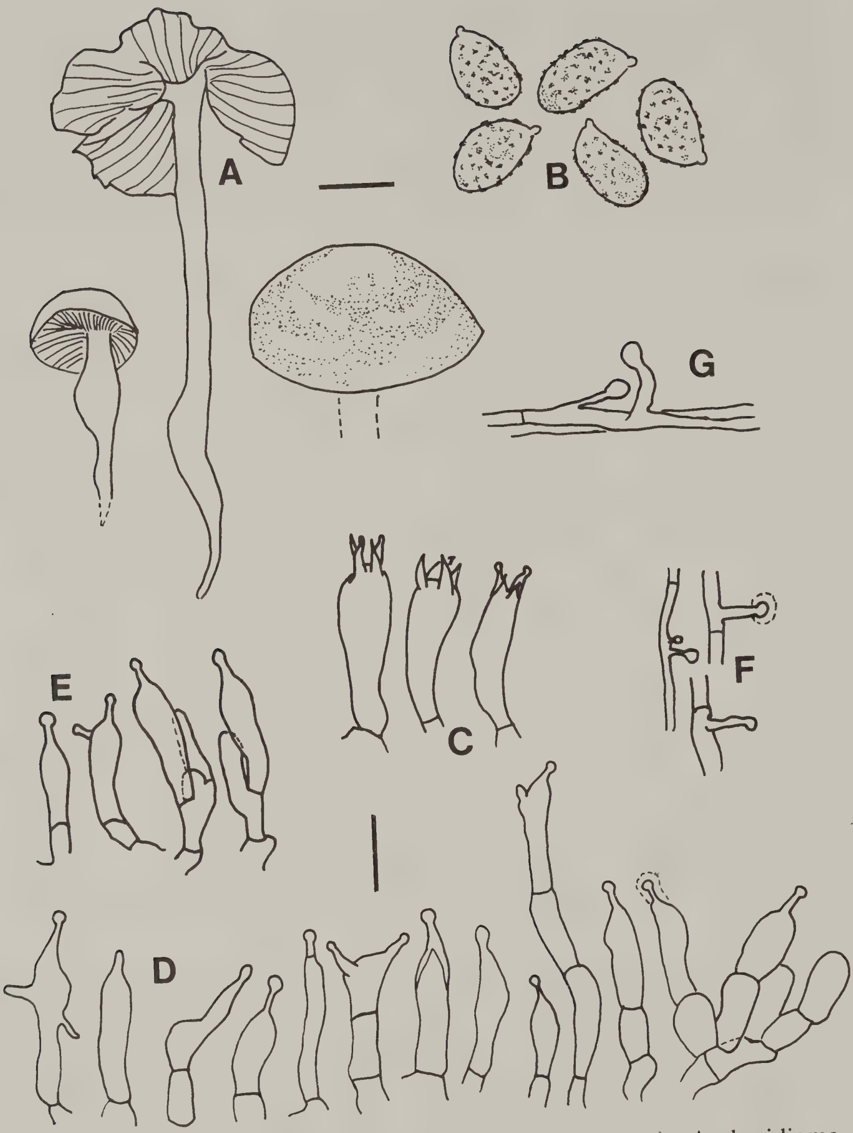


Fig. 3. ***Phaeocollybia tasmanica*** HO 124696 (holotype): A. basidiome, B. basidiospores, C. basidia, D. cheilocystidia, E. pleurocystidia, F. caulocystidia. G. pileocystidia. Scale bar = 5 µm for B, 10 µm for C, D, E, F and G. (A not necessarily to scale, redrawn from photograph).

described for *P. ratticauda* Hk. It is more deeply pigmented in the dried condition. In the three fruit bodies pictured, the pseudorhiza tapers less abruptly below its swollen base than that of *P. ratticauda*. Microscopically the spores of *P. tasmanica* are a deeper melleous colour in 5%KOH than *P. ratticauda*, and are slightly longer and narrower with a less obvious area of lowered ornamentation at the supra-apicular depression in SEM. In addition the cheilocystidia are longer, often bifurcating or asymmetrical (Fig. 3H) and are separated from substantial, inflated, sub-cystidial cells by a septum at which branching is infrequent in most cases. There are no scales on the pileus, but sparse capitate pileocystidia are nevertheless present. The lack of scales and hygrophanous appearance could be due to water-soaking. The upper limit of the spore length range exceeds 6.5 µm placing the species intermediate between sections *Microsporae* and *Versicolores* of Singer's classification (1987).

Uncertain species.

Phaeocollybia primulina (Berk.) Hk. Sydowia **29**, 28-71 (1977).

The type material of this species, collected from Pennant Hills, N.S.W. in 1874-75 by the British "Challenger" expedition, is in poor condition. It consists of three small fruit bodies, yellowish orange in colour, one of which has become detached from a small twig still bearing remains of basal mycelium. A slight amount of golden-yellow pigment similar in colour to styrylpyrone pigments diffuses from lamellar fragments mounted in 5% aqueous KOH. The collection seems to be immature and cystidia can no longer be recovered although previous examiners have observed them to be lecythiform to tibiiform in shape. Many of the spores are not fully developed but some golden yellow, ornamented, dextrinoid spores 7.2-8.4 x 5.1-5.7 µm are present, many of which have a mucronate apex. Spores of this shape are to be found in at least one common species of *Gymnopilus* occurring in the area from which the specimen was collected (Rees, ined.).

This species has been variously placed in *Marasmius* by Berkeley (1877), *Gymnopilus* by Pegler (1965), *Phaeocollybia* by Horak (1977) and affiliations with *Galerina* suggested by Singer (1986). It is now difficult to determine with certainty where it truly belongs. In light of its occurrence on wood, its orange-yellow slightly tomentose pileal surface, the presence of mucronate, dextrinoid spores, lecythiform cystidia and slight amount of diffusing lemon-gold pigment it should probably remain as *Gymnopilus primulinus* (Berk.)Pegler until further collections of the same species can be made or the type subjected to nucleotide analysis.

DISCUSSION

Ecology

The presence of the genus *Phaeocollybia* in Australia could be expected following its discovery in New Zealand and New Guinea where its distribution has been linked to that of *Nothofagus* spp (Horak,1983). In New

South Wales, however, it has been found in warm temperate coastal areas in association with leptospermoid myrtaceous genera such as *Eucalyptus*, *Tristaniopsis*, *Backhousia* and *Syncarpia*. No *Nothofagus* or *Quercus* spp are present in these mainland locations, although conifers such as *Podocarpus* can occasionally be found. In Tasmania *P. ratticauda* Hk., now *P. tasmanica,* has been reported growing "on a *Nothofagus cunninghamii* log" but this appears to be partially covered by soil in the accompanying illustration (Fuhrer & Robinson,1992). This species was also recorded from a pure *Leptospermum* stand in New Zealand (Horak,1983). The absence of *Phaeocollybia* collections from southern S. America is puzzling in light of the presence there of *Nothofagus* forests. However, the area is devoid of dry fruited myrtaceous species with the exception of *Tepualia stipularis* Griseb. which has only been recorded from Chile. The possibility exists that *Phaeocollybia* may yet be found in these locations or that the genus is not as host specific as was formerly thought. On the other hand its distribution may well be linked to dry fruited myrtaceous species rather than *Nothofagus spp.* The presence of *Phaeocollybia* could reasonably be expected in New Caledonia if its occurrence is linked to either *Nothofagus spp* or dry fruited myrtaceous species, both of which occur there as well as in New Guinea. Either as a weak parasite or mycorrhizal symbiont, species of the genus appear to have arisen with, or adapted comfortably to a variety of dry fruited myrtaceous hosts on the Australian mainland. Interestingly, the closest relatives to the Australian species are to be found in Colombia and Borneo suggesting a pan-tropical distribution.

Taxonomy

The similarity in stature and colour of species together with the rareness of fruiting have contributed to difficulties with identification and separation of species within the genus (Smith,1957). Small variations in morphology with regard to basidiospore size and shape, cystidia shape and the presence or absence of clamp connections have been reported for *P. kauffmanii* (Smith)Sing. (Redhead & Norvell,1993). Similar variations together with slight differences in cap colour and scaliness are also to be found in a group of species centred around *P. ratticauda Hk.* in Australia. In this connection, ultrastructural features such as basidiospore ornamentation and plage size have been found useful in separating species, but further work will be needed as more collections become available. The presence of a rat-tail like pseudorhiza in more than one species indicates that this feature may be more wide spread in different species than previously supposed (Horak,1977; Horak & Halling, 1991).

The presence of caulocystidia below ground level is confirmed as a generic feature for all Australian collections as it has been for many northern hemisphere species (Redhead & Malloch,1985; Laber,1991;Redhead &

Norvell,1993). In many Australian collections they have also been found at the middle and apex of the stipe. In addition, pleurocystidia have been found in four out of five taxa described. They are frequently inconspicuous in many genera within the Cortinariaceae (Rees, ined.) but were reported for some *Phaeocollybia spp* by Smith (1957). Capitate pileocystidia have also been found on epicuticular hyphae of all Australian collections. They are occasionally pigmented, sparse to numerous, and can arise terminally or laterally. These structures have not been recorded for other collections world-wide. Re-examination of the three type collections from New Zealand *P. ratticauda* Hk., *P. longipes* Hk. and *P. festiva* Hk. reveals the presence of capitate caulocystidia in all three cases. Capitate pileocystidia are present in *P. ratticauda* but the latter two species have only occasional sub-capitate endings. The type of *P. caudata* Hk. & Halling examined in conjunction with *P. ratticauda* was found to possess caulocystidia at base and apex of the stipe but only narrowly clavate endings on cuticular hyphae of the pileus. Difficulty with spore size limits has arisen when trying to place species in Sections according to Singer (1986,1987). This could be resolved by extending the spore size cut off point for sections to > or < 7.0 µm rather than 6.5 µm.

Biological Status

Attempts to trace the pseudorhiza to a possible connection with densely matted plant host roots in a recent fresh collection of *P. ratticauda* var *myrtaceophila* Rees & Wood were unsuccessful. The pseudorhiza was at least twice as long as the stipe length above ground and no evidence of mycorrhizal infection was found on any neighbouring plant roots. Attempts to culture recent fresh collections of *P. ratticauda* var *myrtaceophila* on potato dextrose agar and modified Melin Norkran's agar were unsuccessful.

Acknowledgements: Our thanks go to Mr M. Mills and Mr G. Kantvilas (HO), Dr B. Segedin and Dr E.H.C. McKenzie (PDD) and Dr R. Halling (NY) for the willing loan of herbarium specimens; Mrs J. DeNardi (UNSW) and Dr P. Wilson (RBG) for help with plant identification and Prof. Dr E. Horak for his continued interest in and advice with the Australian fungal flora and for kindly agreeing to review the manuscript.

REFERENCES

Bandala-Muñoz, V.M., Guzmán, G. & Montoya-Bello, L. (1989). Additions to the knowledge of *Phaeocollybia* (Agaricales, Cortinariaceae) in Mexico, with description of new species. *Mycotaxon* **35**: 127-152.

Bandala, V.M. & Montoya, L. (1994). Further investigations on *Phaeocollybia* with notes on infrageneric classification. *Mycoyaxon* **52**: 397-422.

Berkeley, M.J. (1877). Fungi of the "Challenger" expedition. *J. Linn. Soc., Bot.* **16**: 38.

Cheeseman, G.N. & Grund, D.W. (1985). Preparation of agaric material for SEM examination: an improved method. *Mycotaxon* **23**: 451-455.

Fuhrer, B. & Robinson, R. (1992). *Rainforest fungi of Tasmania and south-east Australia.* p55. CSIRO: Melbourne, Australia.

Garrido, N. (1985). *Index Agaricalium Chilensium.* Cramer, Vaduz.

Guzmán, G., Bandala-Muñoz, V. M. & Montoya-Bello, L. (1987). The known species of *Phaeocollybia* (Agaricales, Cortinariaceae) in Mexico. *Mycotaxon* **30**: 221-238.

Horak, E. (1973). Fungi agaricini Novazealandi. *Beih. Nova Hedwigia* **43**: 183-191.

Horak, E. (1974). Two species of *Phaeocollybia* (Agaricales, Fungi) from India. *Acta Bot. Indica* **2**: 69-73.

Horak, E. (1977). Further additions towards a monograph of *Phaeocollybia. Sydowia* **29**: 28-71.

Horak, E. (1979). *Fungi, Basidiomycetes, Agaricales y Gasteromycetes Secotioides, flora criptogámica de tierra del fuego.* Tomo **XI** - Fasiculo 6, Buenos Aires, Argentina.

Horak, E. (1983). Mycogeography in the south Pacific region: Agaricales, Boletales. *Austral. J. Bot.* Supplementary series **10**: 1-41.

Horak, E. & Halling, R.E. (1991). New records of *Phaeocollybia* from Colombia. *Mycologia* **83**: 464-472.

Imazeki, R. & Hongo, T. (1981). *Coloured illustrations of fungi of Japan* **II.** Osaka. Japan.

Laber, D. (1991). Erganzung zu "Die europäischen Arten der Gattung *Phaeocollybia* und ihr Vorkommen im südlichen Schwarzwald." *Z. Mykol.* **57**: 109-116.

Maerz, A J. & Paul M.R. (1930). *A Dictionary of Colour.* McGraw-Hill Book Company, New York. U.S.A.

Moser, M. (1983). *Keys to agarics and boleti (polyporales, boletales, agaricales, russulales).* Roger Phillips, London. U.K.

Nezdoyminogo, E.L. (1990). *Plantae non vasculares, fungi et bryopsida. Orientis extremi Sovietici. 1. Basidiomycetes.* Nauca, St Petersburg, Russia.

Pegler, D.N. (1965). Studies on australasian Agaricales. *Austral. J. Bot.* **13**: 323-356.

Raithelhuber, J. (1987). *Flora Mycologica Argentina.* I-III. Stuttgart, Germany.

Redhead, S.A. & Malloch, D.W. (1986) The genus *Phaeocollybia* (Agaricales) in eastern Canada and its biological status. *Canad. J. Bot.* **64**: 1249-1254.

Redhead, S.A. & Norvell, L.L. (1993). *Phaeocollybia* in western Canada. *Mycotaxon* **46**: 343-358.

Singer, R. (1961). Diagnoses fungorum novorum Agaricalium II. *Sydowia* **15**: 45-83.

Singer, R. (1970). *Phaeocollybia* (Cortinariaceae - Basidiomycetes). *Fl. Neotrop.* **4**: 3-11.

Singer, R. (1986). *The Agaricales in modern taxonomy.* 4th Edition. pp 663-666. Koeltz. Koenigstein, Germany.

Singer, R. (1987). *Phaeocollybia* in the oak woods of Costa Rica, with notes on extralimital taxa. *Mycol. Helv.* **2**: 247-266.

Smith, A.H. (1957). A contribution toward a monograph of *Phaeocollybia. Brittonia* **9**: 195-217

MYCOTAXON

Volume LVII, pp. 117-123 January-March 1996

FOUR NEW SPECIES OF CORTICIOID FUNGI (BASIDIOMYCOTINA, APHYLLOPHORALES) FROM ARGENTINA

NILS HALLENBERG
Department of Systematic Botany, University of Gothenburg, Carl Skottsbergs gata 22, S-413 19 Göteborg, Sweden

KURT HJORTSTAM
Målaregatan 12, S-441 35 Alingsås, Sweden

Abstract. Four new species of Corticiaceae (Basidiomycotina) are described from Argentina: *Athelopsis virescens, Hyphodontia crustosoglobosa, H. nesporina,* and *Vuilleminia subglobispora.*

ATHELOPSIS VIRESCENS Hallenb. & Hjortstam nov.sp. Fig. 1.

Basidioma resupinatum, laxe adnatum, pelliculare; margine indeterminato. Rhizomorphae nullae. Hymenophorum leve, albidum vel plerumque viridescens. Subiculum tenue, albidum. Systema hyphale monomiticum; hyphae basales tenuitunicatae vel moderate crassiusculae, 2-3 µm latae, leves, vel incrustatissimae; hyphae subhymeniales tenuitunicatae, 3-3.5(-4) µm latae, incrustatissimae. Hyphae semper fibulatae. Cystidia nulla. Basidia subpendiculata, basaliter incrustata, (15-)20-25 x 4-4.5(-5) µm, cum 4 sterigmatibus. Sporae leves, tenuitunicatae, variabiles, ellipsoideae, 5-6(-7) x 2.5-3.2 µm, raro conglutinatae.

Holotypus: Argentina, Tierra del Fuego, Lapataia National Park, on a fallen branch of Nothofagus, NH 1993-03-08, 12483 (GB).
Paratypi: ditto NH 12442, 12443 and 12481; Tierra del Fuego, Est. las Hijas on Nothofagus 1993-03-06 NH 12412; Tierra del Fuego, Ski-lift area N of Ushuaia on Nothofagus 1993-03-09 NH 12518; Tierra del Fuego, near Est. Haberton NH 1993-03-09 12548 on Nothofagus; Chubut, Los Alerces National Park, Alerzal on Nothofagus 1993-03-15 NH 12646, all (GB).

BASIDIOME resupinate, loosely adnate, thin, athelioid.
MARGIN not differentiated and rhizomorphs absent.
HYMENOPHORE smooth, whitish or commonly with a tint of green, in KOH immediately yellowish green.
HYPHAL SYSTEM monomitic; basal hyphae thin to moderately thick-walled, rather straight and uniform, 2.5-3 µm wide, moderately branched, mostly encrusted with rather small crystals, forming a thin, whitish subiculum. Subhymenial hyphae thin-walled, slightly broader, 3-3.5(-4) µm wide, as a rule strongly encrusted with small crystals. All hyphae with clamp-connexions.
CYSTIDIA absent.

BASIDIA in most cases subpedunculate to more rarely pedunculate, basally encrusted, (15-20-25 x 4-4.5(-5) µm, with four sterigmata and a basal clamp-connexion.

SPORES smooth, thin-walled, apparently variable in size and shape, ellipsoid 5-6 (-7) x 2.5-3.2 µm, normally single, rarely glued together, inamyloid, indextrinoid and acyanophilous.

The specimens were found on naked wood or on still-attached bark, always associated with a white rot.

A very characteristic species and in outer appearance it is reminiscent of *Athelopsis glaucina* (Bourdot & Galzin) Parmasto which, however, never is discoloured yellowish green with KOH. Microscopically the latter species is well separated by cylindric spores measuring 9-10 x 2-2.5 µm and invariable glued together in groups of 2 to 4.

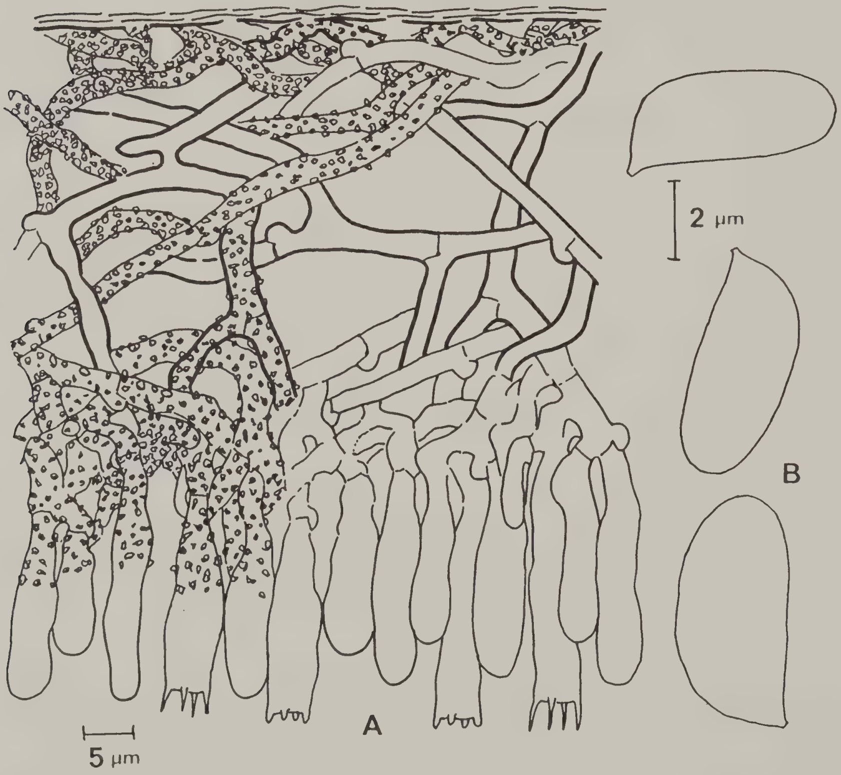


Fig. 1. *Athelopsis virescens*. A, Section through basidiome; B, Spores. From the holotype.

HYPHODONTIA CRUSTOSOGLOBOSA Hallenb. & Hjortstam nov.sp. Fig. 2.

Hyphodontia crustosa (Pers.:Fr.) J. Erikss. tangit, sed cum sporis plus minusve globosis, 4.5 µm diametro vel 5 x 3.8(-4) µm.

Holotypus: Argentina, Chubut, Lago Puelo National Park, mouth of Rio Azul, on a fallen branch of a broad-leaved tree NH 1993-03-18, 12738 (GB).

Paratypi: Argentina, Rio Negro, El Bolson, Loma del Medio, on a fallen branch of a broad-leaved tree, NH 1993-03-18, 12728; Rio Negro, Nauhel National Park, on decayed deciduous wood, Dec. 1987, Havrylenko leg., det. Hjortstam, all (GB).

BASIDIOME resupinate, closely adnate and not easily detachable, confluent.
HYMENOPHORE greyish white to somewhat pale yellowish, at first smooth, then with small, separated and smooth aculei less than 0.2 mm long and approximately 5-6/mm. Margin thin, slightly farinose.
HYPHAL SYSTEM monomitic; hyphae loosely intertwined, 2.5 - 3 µm wide, somewhat irregular in outline, encrusted, thin to moderately thin-walled. All hyphae with clamp-connexions.

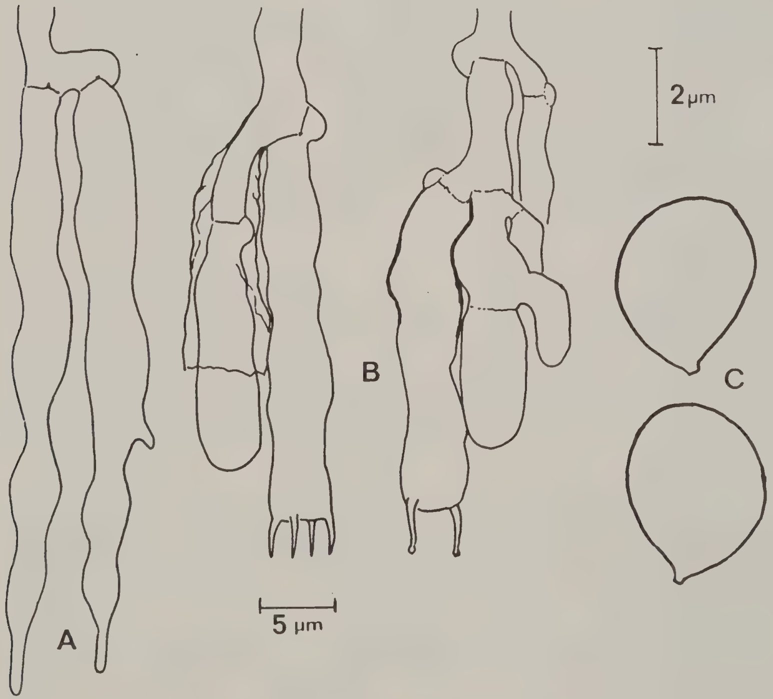


Fig. 2. *Hyphodontia crustosoglobosa.* A, Cystidia; B, Hymenial details showing basidium repetition (left) and wall thickening of basal part of a basidium (right); C, Spores. From the holotype.

CYSTIDIA (or rather hyphal ends) abundant, 30-40 µm long, up to 5 µm wide, irregularly shaped and with a pointed or capitulate tip.
BASIDIA at first short-clavate, then elongated clavate and with a median constriction, 17-25 x 4.5-5 µm, with four, more rarely two sterigmata and a basal clamp-connexion. Basal part of basidia often with thickened walls, occasional repetobasidia observed.
SPORES nearly globose, smooth, with thickened walls, 4.5 µm across (5 x 3.8-4 µm), inamyloid, indextrinoid and acyanophilous.

The species is reminscent of *H. crustosa*, which is a common species at least in Europe and with preference to grow on still attached branches of various deciduous trees. *Hyphodontia crustosoglobosa* is, however, easily separated by subglobose and somewhat thick-walled spores, whereas in *H. crustosa* the spores are subcylindrical and thin-walled.

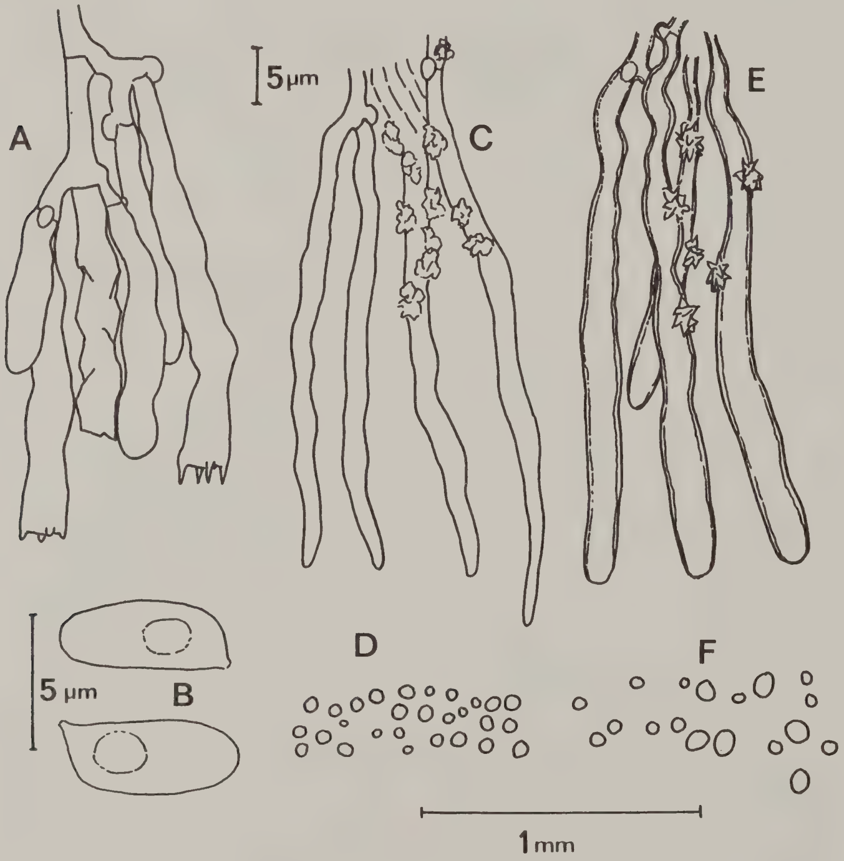


Fig. 3. *Hyphodontia nesporina* (holotype). A, Hymenial details; B, Spores. Comparisons between *Hyphodontia nesporina* (C, D from holotype) and *H. nespori* (E, F from NH 3383). C, E, Hyphal endings in apices of aculei. D, F, Density of aculei on the hymenophore.

HYPHODONTIA NESPORINA Hallenb. & Hjortstam nov.sp. Fig. 3.

Habitu et textura Hyphodontiae nespori (Bres.) J. Erikss. & Hjortstam similis, differt hyphae ad apicem plus minusve subulatis. Cystidia desunt, basidia suburniformia, constricta, 25-30 x 4-5 µm, cum 4 sterigmatibus, sporis anguste ellipsoideis vel plerumque cylindraceis (6-) 6.5-7 x 2.2-2.5 µm.

Holotypus: Argentina, Chubut, Lago Puelo National Park, mouth of Rio Azul, on a standing tree (Myricaceae), NH 1993-03-18, 12745 (GB).
Paratypus: ditto on a fallen log of a broad-leaved tree NH 12743 (GB)

BASIDIOME resupinate, closely adnate, but relatively easy to detach from the substratum.
HYMENOPHORE cracking, whitish to pale yellowish when older, densely aculeate. Aculei about 0.1-0.2 mm long and 10-12/mm, conical or more commonly cylindrical with a fimbriate apex. Margin abrupt.
HYPHAL SYSTEM monomitic; basal hyphae rather thick-walled, (2.5-) 3-4 µm wide and often abundantly encrusted; aculeal hyphae thin-walled to moderately thick-walled, some irregular and subulate, encrusted. All hyphae with clamp-connexions.
CYSTIDIA absent.
BASIDIA typically *Hyphodontia*-like, suburniform with a median constriction or sinuous, 25-30 x 4.5-5 µm, with four sterigmata and a basal clamp-connexion.
SPORES narrowly ellipsoid to more commonly cylindrical, smooth, thin-walled, (6-)6.5-7 x 2.2-2.5 µm, inamyloid, indextrinoid and acyanophilous.

In outer appearance very similar to *Hyphodontia nespori* (Bres.) J.Erikss. & Hjortstam, but microscopically separated by subulate hyphal ends in the aculei. In the latter the hyphal ends are obtuse and also capitate ends always occur. Moreover, the hymenophore is more densely aculeate. Spores and other microscopical details are very similar between the two species.

VUILLEMINIA SUBGLOBISPORA Hallenb. & Hjortstam nov. sp. Fig. 4.

Habitu et textura Vuilleminiae comedenti (Nees : Fr.) Maire affinis, a qua imprimis differt sporis subglobosis 14.5-16(-18) x 9.5-12(-13) µm.

Holotypus: Argentina, Chubut, Lago Puelo National Park, Arroyo Aguja Norte, on fallen log of a broad-leaved tree in a forest with *Libocedrus (Austrocedrus) chilensis* (L. Don) Endl. and *Lomatia hirsuta* (Lam.) Diels., N. Hallenberg & M. Rajchenberg 1993-03-19, NH 12761 (GB).

BASIDIOME resupinate, closely adnate, ceraceous to gelatinous, somewhat horny when dried, about 0.25 mm thick.
HYMENOPHORE smooth, pruinose under the lens, light ochraceous with a slight reddish tint; margin abrupt.
HYPHAL SYSTEM monomitic; hyphae with clamps at all septa, with thin to thickened walls, 2.5-4 µm wide; basal layer composed of densely agglutinated hyphae running parallel to the substratum, rather sparsely branched, hyphae in context more loosely arranged, intertwined and easily separated from each other when mounting for the microscope.
DENDROHYPHIDIA frequent in the hymenium, irregularly branched, hyphoid, intermixed with the basidia.
CYSTIDIA absent.

BASIDIA more or less clavate, sinuous, with a long, tapering base, sometimes with adventitious septa, 10-13(-15) µm wide and up to 150 µm long, with four prominent sterigmata and a basal clamp-connexion.
SPORES subglobose to broadly ellipsoid, 14.5-16(-18) x 9.5-12(-13) µm, with thickened walls, inamyloid, indextrinoid, and acyanophilous.

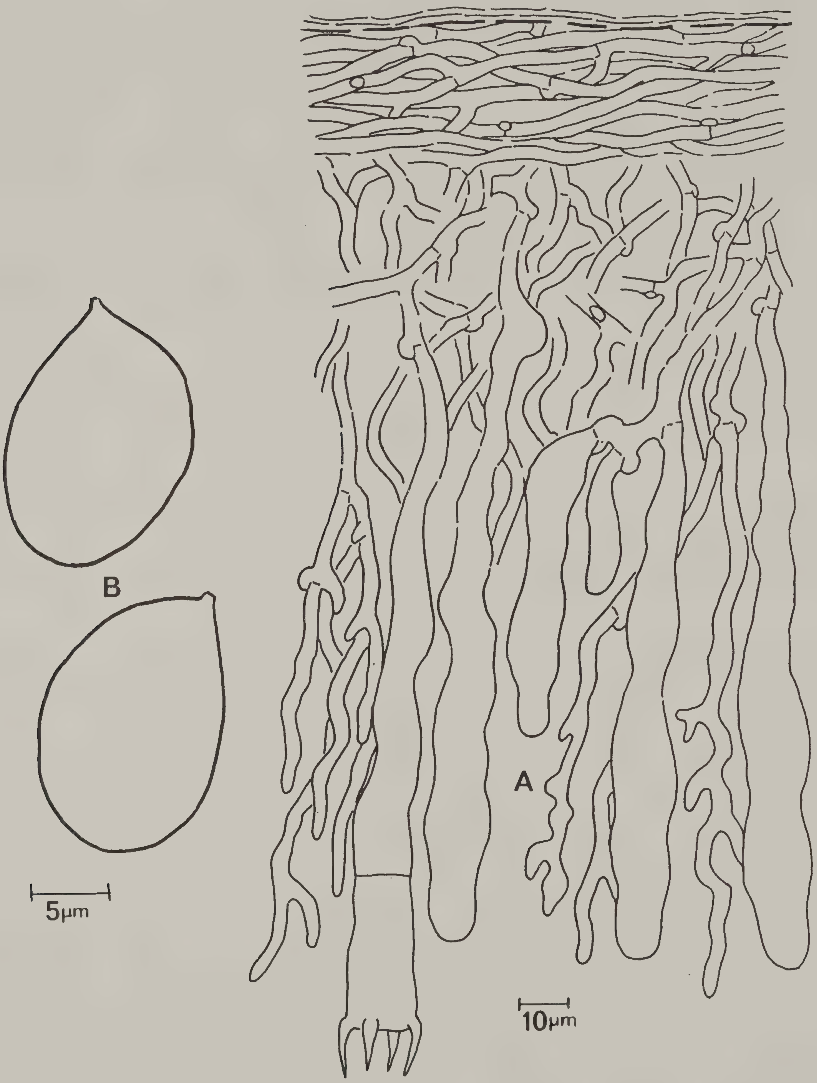


Fig. 4. *Vuilleminia subglobispora.* A, Section through basidiome; B, Spores. From the holotype.

V. subglobispora differs from other members of the genus mainly by basidiome development on the surface of tree bark instead of between bark and wood. Nevertheless, the species is actually decorticating as a result of its decay activities. Other differences are the subglobose to broadly ellipsoid spores and the presence of a well developed basal layer in *V. subglobispora*, a character which most probably is connected with the position of the basidiome. Microscopical characters of the hymenial layer are clearly indicative for the genus *Vuilleminia*. Results from polarity tests based on a few single-spore (7) cultures indicate that the species is tetrapolar which is in accordance with other species of the genus. DNA-sequencing (ITS2, nuclear rDNA) was performed for *V. subglobispora*, as well as for the other species *of Vuilleminia* published so far. The results from this phylogenetic analysis will be published later on, but it is quite clear that the ITS2 sequences from *V. subglobispora* are easily aligned with other representatives of the genus. *V. subglobispora* is separated from other representatives in 34-38 bp (single substitutions and a few deletions). Total length of ITS2 is 186 bp. The ITS2 sequence for *V. subglobispora* is available from the senior author upon request.

Acknowledgement
We thank Hans-Jörgen Winqvist, Lerum, for correcting the Latin.

MYCOTAXON

Volume LVII, pp. 125-143 January-March 1996

INDEX OF FUNGI DESCRIBED FROM THE PANDANACEAE

E.H.C. McKENZIE

Herbarium PDD, Manaaki Whenua - Landcare Research
Private Bag 92170, Auckland, New Zealand

and

K.D. HYDE

Department of Ecology and Biodiversity, University of Hong Kong
Pokfulam Road, Hong Kong

Abstract

Fungi described from members of the Pandanaceae are listed alphabetically. They comprise 35 species from *Freycinetia* (15 ascomycetes, 4 basidiomycetes, and 16 deuteromycetes) and 135 species from *Pandanus* (59 ascomycetes, 15 basidiomycetes, 60 deuteromycetes, and 1 myxomycete). The original reference, synonyms, collections, and herbarium details known to us are given for each species.

Introduction

The monocotyledonous family Pandanaceae has members throughout the Old World tropics to Australia, New Zealand, and other parts of Polynesia (Willis 1973, Mabberley 1987). There are 3 genera: *Freycinetia, Pandanus,* and *Sararanga*. We are investigating the mycobiota on the Pandanaceae (e.g., McKenzie 1995), and towards this end present a list of fungi described from this family. When species that are now regarded as synonyms are included, *Freycinetia* is the substrate for the type specimens of 15 ascomycetes, 4 basidiomycetes, 13 hyphomycetes, and 3 coelomycetes; 59 ascomycetes, 15 basidiomycetes, 25 hyphomycetes, 35 coelomycetes, and 1 myxomycete have been described from *Pandanus*. No fungi have been recorded on *Sararanga*.

The first fungi to be described from the Pandanaceae were *Sphaeria fur* and *S. profuga* (Ehrenberg 1820) on *Pandanus* from the Marshall Islands. Most ascomycete species on *Pandanus* have been described from the Philippines (13), Indonesia (11), and India (6). Hennings (1908) recorded the first ascomycete from *Freycinetia* when he described *Auerswaldia merrillii* Henn. from the Philippines. Most records of ascomycetes on *Freycinetia* are from Hawaii (6), the Philippines (4), and New Zealand (3). Currently the best represented ascomycete genera are *Meliola* and *Nectria*, each with four species described as new from *Pandanus*.

Basidiomycetes are poorly represented on the Pandanaceae. The first to be described was *Polyporus pandani* (Fries 1838) on *Pandanus* in Vietnam. Two rust fungi have been described from *Freycinetia* in Indonesia and New Zealand.

The first deuteromycete described from *Freycinetia* was *Melanconium freycinetiae*, recorded on plants cultivated in Germany (Hennings 1898). Corda (1837) described six deuteromycetes on dead leaves of *Pandanus* growing in botanical gardens in Europe. The best represented genus is *Stachybotrys*, with three species described on *Freycinetia*. Most records of deuteromycetes on *Pandanus* are from the Pacific (14), the Philippines (9), and Japan (5).

The Pandanaceae are poorly represented in Africa, with only 24 species of *Pandanus* known. The only fungi to be described on *Pandanus* in Africa are five basidiomycetes from Gabon, Madagascar, and Zaire, and 3 coelomycetes from Madagascar, São Tomé and Principe, and Zaire.

The list was prepared from an examination of Saccardo's *Sylloge Fungorum* (1882-1972), *Saccardo's Omissions* (Kirk 1985), Petrak's *Index of Fungi* (1920-1939 and Supplement, 1969), and the IMI *Index of Fungi* (1940-). Any original publication which has not been sighted is prefixed with an asterisk (*). For each fungus, full bibliographic details are given - authors' names are abbreviated according to Kirk & Ansell (1992), journal titles are abbreviated according to Lawrence et al. (1968) and Bridson & Smith (1991), and books follow the abbreviations used by Stafleu & Cowan (1976-88). Where information is available, the host plant is indicated and collection details for the type specimens are given, together with herbarium acronyms, which follow Holmgren et al. (1990).

INDEX TO FUNGI ON PANDANACEAE

Ascomycetes described from *Freycinetia*

Auerswaldia merrillii Henn., *Hedwigia 47*: 255, 1908.
≡ *Sphaerodothis merrilli* (Henn.) Theiss. & Syd., *Ann. Mycol. 13*: 578, 1915.
Philippines, Mindoro, Mt Halcon, Nov 1906, E.D. Merrill 5526. On leaves of *Freycinetia* sp.

Chaetosphaeria aotearoae S. Hughes, *New Zealand J. Bot. 4*: 78, 1966.

New Zealand, Auckland, Waitakere Ranges, Ruaotuwhenua, 7 Aug 1963 (PDD 21403, DAOM 93903b). On wood and bark of *Freycinetia banksii.*

The anamorph, *Sporoschisma mirabile* Berk. & Broome, is also present on the specimen.

Clypeosphaeria stevensii Syd. in F. Stevens, *Bernice P. Bishop Mus. Bull. 19*: 107, 1925.

U.S.A., Hawaii, Keauhou, Kona, Bishop Estate Road, Jul 1925, No. 992. On stem of *Freycinetia* sp.

Ellisiodothis microdisca Syd. & P. Syd., *Ann. Mycol. 15*: 221, 1917.

Philippines, Biliran, Jun 1914, R.C. McGregor (Bur. Sci. 18393). On leaves of *Freycinetia* sp.

Guignardia freycinetiae Rehm, *Philipp. J. Sci. 8*: 184, 1913.

Philippines, Luzon, Prov. Laguna, Los Baños, C.F. Baker 58. On dead leaves of *Freycinetia* sp.

Hugueninia freycinetiae J.L. Bezerra & T.T. Barros in Bezerra, Barros & Leal, *Publ. Inst. Micol. Recife 643*: 5, 1970.

New Caledonia. On leaves of *Freycinetia longispica.*

Hypoxylon freycinetiae Rehm, *Leafl. Philipp. Bot. 8*: 2959, 1916.

Philippines, Luzon, Los Baños, Mt Maquiling, Dec 1915, C.F. Baker Nos 3146 & 3927. On dead stems of *Freycinetia* sp. (holotype in S).

In his monograph on *Hypoxylon* Miller (1961) found the type specimens and description to be inadequate to determine the correct placement of this species.

Metasphaeria christophersenii Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 459, 1932.

Western Samoa, Savaii, Oct 1931, Christophersen 2945. On dry lower surface of leaves of *Freycinetia samoensis.*

Mycosphaerella freycinetiae F. Stevens, *Bernice P. Bishop Mus. Bull. 19*: 103, 1925.

U.S.A., Hawaii, Oahu, Kalihi Valley, Dec 1908, Forbes 3. On leaves of *Freycinetia arnotti* (holotype in BISH).

Myiocopron freycinetiae (G.F. Atk.) G. Arnaud, *Ann. Cryptog. Exot. 4*: 88, 1931.

See under *Seynesia atkinsonii.*

Myiocopron freycinetiae (F. Stevens & Ryan) G. Arnaud, *Ann. Cryptog. Exot. 4*: 88, 1931 (see Hyde 1995).

≡ *Peltella freycinetiae* F. Stevens & R.W. Ryan in Stevens, *Bernice P. Bishop Mus. Bull. 19*: 69, 1925.

U.S.A., Hawaii, Oahu, Wahiawa, 3 Jun 1921, No. 977. On *Freycinetia arnotti* (holotype in BISH).

See under *Seynesia atkinsonii* for a discussion of this species.

Nectria freycinetiae (as *freycinetii*) Samuels, *New Zealand J. Bot. 14*: 243, 1976.

New Zealand, Auckland Province, Coromandel Forest Park, Kauaeranga Valley, 27 Aug 1974, J.M. Dingley et al. (PDD 32577). On bases of dead leaves of *Freycinetia banksii.*

An anamorph, *Acremonium* sp., was produced in culture.

Peltella freycinetiae F. Stevens & R.W. Ryan
See *Myiocopron freycinetiae* (F. Stevens & R.W. Ryan) G. Arnaud.
Phyllachora freycinetiae F. Stevens, *Bernice P. Bishop Mus. Bull. 19*: 22, 1925.
U.S.A., Hawaii, Oahu, Kalihi Valley, 2 Jun, No. 184. On leaves of *Freycinetia arnotti* (holotype in BISH).
Pyrenocyclus ambiguus Petr., *Sydowia 9*: 516, 1955.
U.S.A., Hawaii, Lauai, Mahana, Aug 1910, leg. Rock. On bark and bare wood of *Freycinetia arnotti.*
Seynesia atkinsonii F. Stevens & R.W. Ryan in Stevens, *Bernice P. Bishop Mus. Bull. 19*: 69, 1925.
U.S.A., Hawaii, Oahu, Palolo Valley, Mt Olympus, 16 Jun 1921, No. 300. On leaves of *Freycinetia arnotti* (holotype in BISH).
Stevens & Ryan described *S. atkinsonii* on the basis of a herbarium specimen which had the unpublished name *Seynesia freycinetiae*. This specimen is not, as indicated by Arnaud (1931), the type of *Myiocopron freycinetiae* (G.F. Atk.) Arnaud. Arnaud (1931) made a mistake (? editorial) in citing his new combination as *Myiocopron freycinetiae* (G.F. Atk.) G. Arnaud, because he clearly indicated in the same paper that *Peltella freycinetiae* F. Stevens & Ryan was an earlier name and a synonym of the *Myiocopron*. Thus, the *Myiocopron* should read *M. freycinetiae* (F. Stevens & Ryan) G. Arnaud. *Seynesia atkinsonii* is, therefore, a taxonomic, facultative synonym of *Myiocopron freycinetiae* (F. Stevens & Ryan) G. Arnaud, both species being represented by separate types. *Seynesia atkinsonii* occurs on *Freycinetia arnotti* in Hawaii, and is unrelated to *Seynesia* as it has fissitunicate asci. It seems unlikely to belong in *Myiocopron*, since ascospores are two-celled. Placement in the Microthyriaceae should be considered.
Sphaerodothis merrilli (Henn.) Theiss. & Syd.
See *Auerswaldia merrillii* Henn.
Stictis subiculata P.R. Johnst., *New Zealand J. Bot. 21*: 271, 1983.
New Zealand, Auckland, Waitakere Ranges, Cascades Track, 9 Mar 1981, P.R. Johnston & G.J. Samuels (PDD 41899). On dead leaves of *Freycinetia baueriana* ssp. *banksii.*
An anamorph, ?*Coleophoma* sp., formed in culture and was also present on the leaves.

Basidiomycetes described from *Freycinetia*

Crepidotus parietalis E. Horak, *Ber. Schweiz. Bot. Ges. 87*: 232, 1977 (1978).
New Zealand, Westland, Hari Hari, Big Wanganui, 18 Feb 1969, E. Horak (PDD 27137, ZT 69/94). On rotting leaves of *Freycinetia.*
Odontia flexibilis G. Cunn., *Trans. Roy. Soc. New Zealand 86*: 99, 1959.
New Zealand, Wellington, Lake Papaetonga, 50ft, May 1956, G.H. Cunningham (PDD 17897). On bark of dead stems of *Freycinetia banksii.*

Puccinia freycinetiae McKenzie, *New Zealand J. Bot. 26*: 99, 1988.
New Zealand, Taranaki, Oakura, Mar 1983, P.J. Garnock-Jones (PDD 43835). On *Freycinetia baueriana* ssp. *banksii*.
Uredo freycinetiae Racib., *Paras. Alg. Pilz. Javas 3*: 12, 1900.
Indonesia, Java, Salak and Mt Pantjar. On leaves of *Freycinetia imbricata*.

Hyphomycetes described from *Freycinetia*

Catenularia velutina Syd. & P. Syd., *Philipp. J. Sci. 8*: 507, 1913.
Philippines, Luzon, Prov. Laguna, Mt Maquiling, E.D. Merrill. On withering and dying leaves of *Freycinetia* sp.
Chalarodes bisetis McKenzie, *Mycotaxon 42*: 91, 1991.
New Zealand, Auckland, Waitakere Ranges, Spraggs Bush, 19 Apr 1987, R.E. Beever (PDD 57220). On dead leaves of *Freycinetia baueriana* ssp. *banksii*.
Chalarodes obconica McKenzie, *Mycotaxon 42*: 91, 1991.
New Caledonia, Mt Panié, 1300m, 15 Dec 1990, J.S. Dugdale (PDD 58421). On dead leaves of *Freycinetia ?graminifolia*.
Cryptophiale caudata McKenzie & Kuthub., *Mycotaxon 47*: 87, 1993.
Malaysia, Selangor, Genting Highlands, Gunung Bunga Buah, 18 Aug 1992, E.H.C. McKenzie (PDD 60584).
Cryptophiale novae-caledoniae McKenzie & Kuthub., *Mycotaxon 47*: 89, 1993.
New Caledonia, Mt Panié, 1500m, 15 Dec 1990, J.S. Dugdale (PDD 60585). On dead leaves of *Freycinetia* sp.
Ellisembia palauensis McKenzie, *Mycotaxon*: In Press, 1995.
Palau, Babeldaob, 10 Aug 1991, E.H.C. McKenzie (PDD 60918). On *Freycinetia* sp.
Ellisembia vaginata McKenzie, *Mycotaxon*: In Press, 1995.
New Caledonia, Mt des Koghis, 25 Feb 1994, E.H.C. McKenzie & T.K. Crosby (PDD 63340). On *Freycinetia* sp. Also on *Pandanus* sp.
Guedea novae-zelandiae S. Hughes, *New Zealand J. Bot. 18*: 65, 1980.
New Zealand, Auckland, Cornwallis, 31 Dec 1962, J.M. Dingley (PDD 36099, DAOM 93822). On decaying wood of *Freycinetia banksii*.
Sporidesmium freycinetiae McKenzie, *Mycotaxon*: In Press, 1995.
Cook Islands, Rarotonga, Apr 1985, P.S. Dale (PDD 57499). On *Freycinetia wilderi*.
Stachybotrys breviusculus McKenzie, *Mycotaxon 41*: 180, 1991.
New Zealand, Northland, Puketi, 23 Oct 1987, E.H.C. McKenzie & P.R. Johnston (PDD 57594). On *Freycinetia baueriana* ssp. *banksii*.
Stachybotrys freycinetiae McKenzie, *Mycotaxon 41*: 183, 1991.
New Zealand, Waikato, Mt Pirongia, Track 3, 19 Nov 1984, E.H.C. McKenzie (PDD 57639). On *Freycinetia baueriana* ssp. *banksii*.
Stachybotrys nephrodes McKenzie, *Mycotaxon 41*: 185, 1991.
American Samoa, Tutuila, Jun 1987, P.C. Gardner (PDD 57631). On *Freycinetia* sp. Also on *Pandanus* sp.

Zebrospora bicolor McKenzie, *Mycotaxon 41*: 189, 1991.
New Zealand, Northland, Omahuta State Forest, Kauri Reserve, 22 Oct 1987, E.H.C. McKenzie (PDD 57681).

Coelomycetes described from *Freycinetia*

Melanconium freycinetiae Henn., *Verh. Bot. Vereins Prov. Brandenburg 40*: 173, 1898.
Germany, Berlin, botanical gardens, glasshouse, Apr 1894. On leaves of *Freycinetia insignis*.
Peltosoma freycinetiae Syd., *Leafl. Philipp. Bot. 9*: 3130, 1925.
Philippines, Irosin, Sorsogon. On leaves of *Freycinetia maxima*.
Phomopsis eumorpha Sacc., *Atti Accad. Sci. Veneto-Trentino-Istriana, Ser. 3, 10*: 72, 1917.
Philippines. On dead branches of *Freycinetia* sp.

Ascomycetes described from *Pandanus*

Anthostomella calocarpa Syd. & P. Syd.
See *Pandanicola calocarpa* (Syd. & P. Syd.) K.D. Hyde.
Anthostomella lucens Sacc., *Nuovo Giorn. Bot. Ital. n.s. 23*: 201, 1916.
Philippines, Luzon, Los Baños, Mt Banahao, Sep 1916, C.F. Baker 202. On dead leaves of *Pandanus* sp. (holotype in K).
Anthostomella pandani (Rabenh.) Sacc., *Syll. Fung. 1*: 292, 1882.
≡ *Sphaeria pandani* Rabenh., *Hedwigia 17*: 45, 1878.
India, Calcutta. Kurz (R. F. E. No 2338). On dried leaves of *Pandanus furcatus* (holotype in PAD).
Asterina pandani Rostr.
See *Echidnodes pandani* (Rostr.) Hansf.
Auerswaldia pandani Rehm, *Leafl. Philipp. Bot. 6*: 2273, 1914.
Philippines, Luzon, Prov. Laguna, Mt Banahao, Dec 1913, C.F. Baker 2236. On dead leaf bases of *Pandanus*.
Aulacostroma palawanense Syd. & P. Syd., *Philipp. J. Sci. 9*: 176, 1914.
Philippines, Palawan, Taytay, Apr-May 1913, E.D. Merrill S 175, 8751. On leaves of *Pandanus merrillii*.
Aulographum (as *Ailographum*) ***intricatum*** Berk. & Broome, *J. Linn. Soc. 14*: 133, 1875.
Sri Lanka, No. 1226. On leaves of *Pandanus*.
Aulographum (as *Ailographum*) ***pandani*** Cooke, *Grevillea 5*: 17, 1876.
India, leg. Hobson 119. On leaves of *Pandanus odoratissimus*.
Bakeromyces philippinensis Syd. & P. Syd., *Ann. Mycol. 15*: 203, 1917.
Philippines, Luzon, Prov. Laguna, Mt Banahao, Dec 1913, C.F. Baker 2246. On dead leaves of *Pandanus utilissimus*.

Clithris pandani L.R. Tehon, *Bot. Gaz. (London) 65*: 555, 1918.
Puerto Rico, San Juan, 16 Nov 1913, F.L. Stevens (ILL 7426). On fallen leaves of cultivated *Pandanus*.

Didymella pandani Höhn., *Akad. Wiss. Wien Sitzungsber., Math.-Naturwiss. Kl., Abt. 1, 129*: 167, 1920.
Indonesia, Java, Buitenzorg, Botanical Gardens, 1907, F. v. Höhnel. On dead leaves of *Pandanus* sp. (holotype in FH).

Didymella pandanicola Syd. & P. Syd.
See *Oxydothis pandanicola* (Syd.) Petr.

Dimerosporium pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 460, 1932.
Western Samoa, Upolu, 1 Aug 1929, Christophersen 381. On dried leaves of *Pandanus lambooensis* (as *lanutooensis*).

Dothidasteromella pandani Höhn., *Mitteil. Bot. Inst. Techn. Hochsch. Wien 9*: 9, 1932.
Indonesia, Java. On leaves of *Pandanus* sp.

Echidnodes pandani (Rostr.) Hansf., *Mycol. Pap. 15*: 173, 1946.
≡ *Asterina pandani* Rostr., *Bot. Tiddssk. 24*: 211, 1902.
Thailand, Koh Chang Island. On leaves of *Pandanus*.
≡ *Lembosia pandani* (Rostr.) Theiss., *Ann. Mycol. 11*: 457, 1913.
= *Lembosia pandani* Rehm, *Leafl. Philipp. Bot. 8*: 2932, 1916, non *L. pandani* (Rostr.) Theiss.
Philippines, hills back of Paete, Apr 1914, C.F. Baker 3113b. On *Pandanus*.

Echidnodes sandwicensis Petr., *Sydowia 6*: 366, 1952.
U.S.A., Hawaii, Oahu, Sacrid Fatt Falls, 4 Dec 1927, C.L. Shear & N.E. Stevens 322a. On dead leaves of *Pandanus odoratissimus*. U.S.A., Hawaii, Molokai, Kaluaaha Valley, 12 Jul 1928, O. Degener & H. Wiebke. On *P. tectorius*.

Ellisiodothis pandani Syd. & P. Syd., *Ann. Mycol. 12*: 565, 1914.
Philippines, Prov. Bulacan, Angat, Sep 1913, M. Ramos (Bur. Sci. 21821). On leaves of *Pandanus luzonensis*.

Erinella alboflaveola Penz. & Sacc., **Malpighia 15*: 217, 1902.
Indonesia, Java, Tjibodas. On dead leaves of *Pandanus*.

Glomerella pandani Syd., *Ann. Mycol. 30*: 100, 1932.
Philippines, Irosin, Prov. Sorsogon, Jun 1916, A.D.E. Elmer 16367. On dead leaves of *Pandanus utilissimus*.

Heraldoa pandani Bat., *Publ. Inst. Mic. Recife 133*: 4, 1959. Also in *Atti Ist. Bot. Univ. Pavia, Ser. 5, 16*: 107, 1959.
Singapore, Aug 1917, C.F. Baker (Fungi Malayana 4444). On leaves of *Pandanus utilis*.

Hypocrea hemisphaerica Doi, *Bull. Natl. Sci. Mus. 1(4)*: 129, 1975.
Papua New Guinea, Lae, near Markham Bridge, 27 Nov 1971, Y. Doi (TNS 223932, PNG). On decayed log of *Pandanus*.

Hyponectria pandani Racib., *Paras. Alg. Pilz. Javas 1*: 16, 1900.
Indonesia, Java. On leaves of *Pandanus littoralis* and *Pandanus* sp.

Isia neocaledoniensis (C. Moreau) D. Hawksw. & Manohar., *Trans. Brit. Mycol. Soc. 71*: 334, 1978.
≡ *Thielavia neocaledoniensis* C. Moreau in B. Huguenin, *Bull. Soc. Mycol. France 81*: 699, 1965.

New Caledonia, 11 Dec 1962 (IFOM 75). On living leaves of *Pandanus* sp.

Johansonia pandani E. Müll., *Sydowia 8*: 55, 1954.

Indonesia, Java, Mt Dedeh, Puntjak-pas, 1450m, 1946, L.G.E. Kalshoven. On living leaves of *Pandanus*.

Lembosia pandani Rehm

See *Echidnodes pandani* (Rostr.) Hansf.

Lembosia pandani (Rostr.) Theiss.

See *Echidnodes pandani* (Rostr.) Hansf.

Leptosphaeria pandani Tassi, *Bull. Lab. Orto Bot. Reale Univ. Siena 6*: 125, 1904.

Italy, Sienna, Apr 1903. On dried leaf sheaths of *Pandanus utilis*, in greenhouse in botanical gardens.

Leptosphaeria pandanicola Sawada, *Special Publ. Coll. Agric. Natl. Taiwan Univ. 8*: 71, 1959.

Taiwan, Pref. Ilan, Chinmien, 23 May 1917, K. Sawada. On leaves of *Pandanus odoratissimus*.

This species was described without a Latin diagnosis, and therefore is invalid under Article 36.1 of the International Code of Botanical Nomenclature.

Linocarpon livistonae (Henn.) K.D. Hyde, *Trans. Mycol. Soc. Japan 29*: 349, 1988.

= *Linospora pandani* Rehm, *Leafl. Phil. Bot. 8*: 2954, 1916.

Philippines, Luzon, Prov. Laguna, Los Baños, Apr 1914, S.A. Reyes & C.F. Baker 3045. On *Pandanus sabutan*. Mt Banahao, Oct 1913, C. F. Baker 2248. On dead leaves of *Pandanus utilissimus*.

Linocarpon pandani (Syd. & P. Syd.) Syd. & P. Syd., *Ann. Mycol. 15*: 210, 1917.

≡ *Linospora pandani* Syd. & P. Syd., *Ann. Mycol. 11*: 60, 1913.

Philippines, Mindanao, Davao, Mar 1904, E.B. Copeland 592, on leaves of *Pandanus laevis* (holotype in S). This species has the same collection details as *Sphaeropsis pandani* Henn.

Linospora pandani Rehm

See *Linocarpon livistonae* (Henn.) K.D. Hyde.

Linospora pandani Syd. & P. Syd.

See *Linocarpon pandani* (Syd. & P. Syd.) Syd. & P. Syd.

Lophodermium javanicum Penz. & Sacc. var. ***pandani*** Penz. & Sacc., *Malpighia 11*: 529, 1897.

Indonesia, Java, Tjibodas, 27 Feb 1897, O. Penzig 185 (PAD). On dead leaves of *Pandanus*.

Meliola juttingii Hansf., **Reinwardtia 3*: 99, 1954.

Indonesia, Java. On *Pandanus*.

Meliola pandani Syd., *Ann. Mycol. 26*: 89, 1928.

Borneo, Myburgh Prov., Sandakan, Oct-Dec 1921, A.D.E. Elmer 20075, 20062. On leaves of *Pandanus affinis*.

Meliola pandani Sawada & W. Yamam. in Sawada, *Special Publ. Coll. Agric. Natl. Taiwan Univ. 8*: 35, 1959, non *M. pandani* Syd.

Taiwan, Pref. Pingtung, Linpien, R. Suzuki, 9 Oct 1908. On leaves of *Pandanus odoratissimus*.

Meliola pandanicola Hansf. & Deighton, *Mycol. Pap. 23*: 74, 1948.
Sierra Leone, Futa (Gallinas), 20 Apr 1937, F.C. Deighton M2203. On leaves of *Pandanus candelabrum*.

Metasphaeria fur (Ehrenb.) Sacc., *Syll. Fung. 2*: 182, 1883.
≡ *Sphaeria fur* Ehrenb. in Nees, *Horae Phys. Berol.*: 92, 1820.
Marshall Islands, Radak, leg. Chamisso. On bark of *Pandanus*.
Known only from the type collection. *Metasphaeria* is a nomen ambiguum, and this species is possibly a *Leptosphaeria*.

Metasphaeria profuga (Ehrenb.) Sacc., *Syll. Fung. 2*: 182, 1883.
≡ *Sphaeria profuga* Ehrenb. in Nees, *Horae Phys. Berol.*: 92, 1820.
Marshall Islands, Radak, leg. Chamisso. On bark of *Pandanus*.
Known only from the type collection. *Metasphaeria* is a nomen ambiguum, and this species is possibly a *Leptosphaeria*.

Microcyclus pandani B. Huguenin, *Bull. Soc. Mycol. France 80*: 176, 1964.
French Polynesia, Society Islands, Bora Bora, 11 Apr 1959, R. Millaud (IFO PF 5994). On leaves of *Pandanus tectorius*.

Mycosphaerella pandani Tilak in T.S. Viswan. & Tilak, *Sydowia 14*: 311, 1960.
India, Poona, 10 Aug 1958, S.T. Tilak (HCIO, IMI). On living leaves of *Pandanus fascicularis*.

Myiocopron** (as Myocopron)* ***pandani Höhn., *Ann. Mycol. 17*: 115, 1919.
Indonesia, Java, Buitenzorg, Botanical Gardens, 1907, F. v. Höhnel. On dried leaves of *Pandanus* sp. (holotype in FH).

Nectria consors (Ellis & Everh.) Seaver, *Mycologia 1*: 61, 1909.
= *Nectria ignia* Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 118*: 1475, 1909.
Indonesia, Java, in Tjibodas woods, 1908. On decaying leaves of *Pandanus*.
According to Samuels (1977) *Nectria ignia* cannot be distinguished from the earlier described *N. consors*.

Nectria ignia Höhn.
See *Nectria consors* (Ellis & Everh.) Seaver.

Nectria importata Rehm, *Hedwigia 27*: 171, 1888.
Germany, Berlin, leg. Magnus. On old fibre of *Pandanus*, in botanical gardens.

Nectria ochroleuca (Schwein.) Berk., *Grevillea 4*: 16, 1875.
= *Pseudonectria tornata* Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 118*: 1470, 1909.
Indonesia, Java, in Tjibodas woods, 1908. On decaying leaves of *Pandanus* sp. (holotypes in FH).
Type specimens of *Pseudonectria tornata* and *Nectria ochroleuca* were examined and found to be identical by Rossman et al. (1993).

Nectria pandani Tul. & C. Tul., *Select. Fung. Carpol. 3*: 71, 1865.
France. Parasitic on *Melanconium pandani*.

Neopeckia rhodosticta (Berk. & Broome) Sacc. var. ***magnifica*** Rehm, *Leafl. Philipp. Bot. 8*: 2947, 1916.
Philippines, Prov. Laguna, Los Baños, Feb 1914, S.A. Reyes & C.F. Baker 3047. On *Pandanus sabotan*.

Oxydothis pandani B. Huguenin, *Bull. Soc. Mycol. France 80*: 173, 1964.
French Polynesia, Tubuai Islands (Austral Islands), Rurutu, 12 Oct 1962, B. Huguenin (IFO PF 62233). On wilting leaves of *Pandanus tectorius*.

= *Schizochora pandani* F. Stevens, *Bernice P. Bishop Mus. Bull. 19*: 20, 1925.

U.S.A., Hawaii, Oahu, Waiahole Ditch Trail, 6 Jun, No. 408; Kalihi Valley, 2 Jun, No. 187. On leaves of *Pandanus odoratissimus*.

Oxydothis pandanicola (Syd. & P. Syd.) Petr., *Sydowia 6*: 367, 1952.

≡ *Didymella pandanicola* Syd. & P. Syd., *Philipp. J. Sci. 9*: 164, 1914.

Philippines, Palawan, Silanga, May 1913, E.D. Merrill 8918. On dead leaves of *Pandanus*.

Pandanicola calocarpa (Syd. & P. Syd.) K.D. Hyde, *Sydowia 46*: 36, 1994.

≡ *Anthostomella calocarpa* Syd. & P. Syd., *Philipp. J. Sci. 8*: 272, 1913.

Philippines, Luzon, Manila, 7 Oct 1912, E.D. Merrill S 55. On the base of dead leaves of *Pandanus tectorius* (holotype in S).

Parastigmatea pandani B. Huguenin, *Bull. Soc. Mycol. France 80*: 181, 1964.
New Caledonia, Loyalty Islands, Lifou, 6 Dec 1958, J. Marty (IFO IL 58.92). On living leaves of *Pandanus tectorius*.

Phomatospora cylindrotheca Petr., *Sydowia 7*: 394, 1953.
U.S.A., Hawaii, Kalapaua, 13 Oct 1928, C.L. Shear & N.E. Stevens 1129. On dead leaves of *Pandanus* sp. (holotype in W).

Phomatospora pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 38*: 534, 1931.
Australia, Queensland, Moreton Bay, Stradbroke Island, 21 Jan 1927, leg. White. On dried leaves of *Pandanus pedunculatus* var. *stradbrookeensis*.

Physalospora pandani Ellis & Everh., *Proc. Acad. Nat. Sci. Philadelphia 1890*: 230, 1890.
U.S.A., Tennessee, Knoxville, Jan 1890, F.L. Scribner. On leaves of *Pandanus* in greenhouse (holotype in NY).

Physalospora pandani F. Stevens & A. Peirce, *Indian J. Agric. Sci. 3*: 913, 1933, non *P. pandani* Ellis & Everh.
India. On leaves of *Pandanus* sp.

Placoasterella (as *Placsoterella*) ***pandanicola*** A.W. Subhedar & V.G. Rao, *Botanique Nagpur 9*: 65, 1978 (1980).
India, Karnataka, 21 km from Jog Falls, at Honavar Road, 14 Dec 1974, A.W.S. AMH 3545. On stems of *Pandanus minor*.

Pyrenula flagellata H. Harada, *Bryologist 96*, 635. 1993.
Northern Mariana Islands, Saipan, Mt Takpochao, 430m, 9 May 1992, Harada 12322 (holotype in Natural History Museum, Chiba). On bark of *Pandanus*.

Rosellinia pandanicola (Berk. & Broome) Sacc., *Syll. Fung. 1*: 266, 1882.

≡ *Sphaeria pandanicola* Berk. & Broome, *J. Linn. Soc. 14*: 129, 1875.

Sri Lanka, No. 431. On leaves of *Pandanus odoratissimus*.

Schizochora pandani F. Stevens
See *Oxydothis pandani* B. Huguenin.

Solenopezia mellina Penz. & Sacc., **Malpighia 15*: 213, 1902.
Indonesia, Java, near Buitenzorg. On dead leaves of *Pandanus*.

Sphaeria fur Ehrenb.
See *Metasphaeria fur* (Ehrenb.) Sacc.

Sphaeria pandani Rabenh.
See *Anthostomella pandani* (Rabenh.) Sacc.
Sphaeria pandanicola Berk. & Broome
See *Rosellinia pandanicola* (Berk. & Broome) Sacc.
Stigmatea cinereomaculans Rehm, *Philipp. J. Sci. 8*: 257, 1913.
Philippines, Luzon, Prov. Laguna, Los Baños, C.F. Baker 622. On leaf sheath of *Pandanus*.
Stigmatea pandani Pat., *Bull. Soc. Mycol. France 20*: 136, 1904.
French Polynesia, Gambier Islands, M.L. Seurat. On living leaves of *Pandanus odoratissimus*.
Thielavia neocaledoniensis C. Moreau
See *Isia neocaledoniensis* (C. Moreau) D. Hawksw. & Manohar.
Tryblidium (as *Triblidium)* ***pandani*** Pat., *Bull. Soc. Mycol. France 22*: 53, 1906.
French Polynesia, Rikitea. On leaves of *Pandanus*.
Venturia borgiana Sacc., *Nuovo Giorn. Bot. Ital. n.s. 22*: 36, 1915.
Malta, S. Antonio. On leaves of *Pandanus utilis*.
Vestergrenia pandani P.B. Chavan & Hosag., *J. Econ. Taxon. Bot. 5*: 448, 1984.
India, Maharashtra, Satara, Science College, 6 Jul 1974, B.P. Chavan (Science College 504). On living leaves of *Pandanus fascicularis*.

Basidiomycetes described from *Pandanus*

Agaricus anthocephalus Lév.
See *Panus anthocephalus* (Lév.) Fr.
Boninogaster phalloides Kobayasi, **Bot. Mag. (Tokyo) 51*: 753, 1937.
Titizima Island. On decayed stump of *Pandanus boninensis*.
Botryobasidium pandani J. Boidin & G. Gilles, *Mycotaxon 14*: 293, 1982.
Gabon, Libreville, May 1979, G. Gilles (LY 9328). On *Pandanus candelabrum*.
Catilla pandani (Pat.) Pat.
See *Cyphella pandani* Pat.
Claudopus pandanicola Horak, *Beih. Nova Hedwigia 65*: 35, 1980.
Papua New Guinea, Eastern Highlands, Goroka, Marafunga, 2400m, 8 Jan 1972, E. Horak (ZT 72/42). On rotting leaves of *Pandanus* sp.
Cyphella pandani Pat., *Bull. Soc. Mycol. France 22*: 47, 1906.
≡ *Catilla pandani* (Pat.) Pat., *Bull. Soc. Mycol. France 31*: 32, 1915.
French Polynesia, Rikitea, M.L. Seurat. On fallen branches of *Pandanus*.
Fomes pandani (Fr.) Sacc.
See *Polyporus pandani* Fr.
Lactarius pandani Heim, *Candollea 7*: 376, 1938.
Madagascar. On rotten wood of *Pandanus*.
Lactarius pandani Heim f. ***intermedius*** Heim, *Bull. Jard. Bot. État 25*: 20, 1955.
Zaire (Belgian Congo).

Marasmius pandanicola Henn., *Notizbl. Königl. Bot. Gart. Berlin 1*: 228, 1897.

Marshall Islands. On trunk of *Pandanus*.

Known only from the type collection. Singer (1973) suggests that this may be close to, or perhaps identical with *M. semiustus* var. *abortivus*. There is no material of *M. pandanicola* available.

Panus anthocephalus (Lév.) Fr., *Nov. Symb. Mycol.*: 40, 1851.

≡ *Agaricus anthocephalus* Lév., *Ann. Sci. Nat. Bot., Sér. 3, 5*: 115, 1846.

Madagascar. On trunk of *Pandanus*.

Peniophora gabonensis Boidin, Lanq. & Gilles, *Bull. Soc. Mycol. France 107*: 134, 1991.

Gabon, Mondah Forest, 5 Nov 1978, G. Gilles (LY 8969). On *Pandanus candelabrum*.

Pleurotus tahitensis Pat., *Bull. Soc. Mycol. France 22*: 51, 1906.

French Polynesia, Society Islands, Tahiti, Fakahina, Tikahau, M.L. Seurat. On dead trunk of *Pandanus*.

Polyporus pandani Fr., *Epicr. Syst. Mycol.*: 469, 1838.

≡ *Fomes pandani* (Fr.) Sacc., *Syll. Fung. 6*: 202, 1888.

Vietnam. On trunk of *Pandanus*.

Pterula fructicola Bres., *Hedwigia 56*: 304, 1915.

Philippines, Luzon (Bureau of Science 20050). On old fruit of *Pandanus* sp.

Scleroderma pandanaceum F. Muell. in Berk., *J. Linn. Soc. 13*: 171, 1872.

Australia, Queensland, Rockingham Bay, J. Dallachy. Substrate not given.

According to Cunningham (1944) the type is no longer at Kew and the description is too fragmentary to permit positive identification. However, Cunningham does list it as a synonym of *S. verrucosum* (Vaill.) Pers.

Ungulina spermolepidis Pat. var. ***pandani*** Pat., *Bull. Soc. Mycol. France 22*: 51, 1906.

French Polynesia, Society Islands, Tahiti, Papeete, M.L. Seurat. On trunk of *Pandanus*.

Volvaria pruinosa P.W. Graff, *Philipp. J. Sci. 8*: 302, 1913.

Philippines, Luzon, Manila, Pasay, 29 Jul 1912, E.D. Merrill 8723. On sandy ground under *Pandanus tectorius*.

Hyphomycetes described from *Pandanus*

Acremoniella atra (Corda) Sacc. *Syll. Fung. 4*: 302, 1886.

≡ *Acremonium atrum* Corda, *Icon. Fung. 1*: 11, 1837.

Germany, Berlin. On decaying leaves of *Pandanus*.

Acremonium atrum Corda

See *Acremoniella atra* (Corda) Sacc.

Aplosporella (as *Haplosporella*) ***pandanicola*** A.K. Roy, *Curr. Sci. 33*: 442, 1964.

India, Assam, Borbheta, 26 Jun 1963, A.K. Roy (HCIO 28231). On leaves of *Pandanus minor*.

Botrytis olivacea (Corda) Sacc., *Syll. Fung. 4*: 131, 1886.
≡ *Polyactis olivacea* Corda, *Icon. Fung. 1*: 18, 1837.
Czechoslovakia. On decaying leaves of *Pandanus odoratissimus*.

Capillaria oligocarpa Corda
See *Sporotrichum oligocarpum* (Corda) Rabenh.

Chloridium hippotrichoidea Corda
See *Pleurophragmium hippotrichoides* (Corda) M.B. Ellis.

Dactylaria iriomoteana Matsush., *Matsushima Mycol. Mem. 5*: 10, 1987.
Japan, Iriomote Island, 7 Feb 1985, T. Matsushima (MFC 12889). On rotten leaf of *Pandanus tectorius*.

Diplococcium pandani B. Huguenin, *Bull. Soc. Mycol. France 80*: 182, 1964.
Wallis and Futuna, Futuna, 16 Jul 1962, F. Cohic (IFO WF 62 177). On leaves of *Pandanus tectorius*.

Ellisembia paravaginata McKenzie, *Mycotaxon*: In Press, 1995.
Malaysia, Kuala Lumpur, University of Malaya, Botanical Gardens, 12 Aug 1992, E.H.C. McKenzie (PDD 60538). On *Pandanus* sp.

Epicoccum nigrum Link, *Magazin Ges. Naturf. Freunde Berlin 7*: 32, 1816.
= *Epicoccum pandani* Henn., *Hedwigia 41*: 118, 1902.
Brazil, São Paulo, 21 Jun 1901, A. Puttemans 278. On leaves of *Pandanus veitchi*, in botanical gardens.

Epicoccum pandani Henn.
See *Epicoccum nigrum* Link.

Filosporella aquatica Nawawi, *Trans. Brit. Mycol. Soc. 67*: 175, 1976.
Malaysia, Tasek Bera, 31 May 1972 (IMI 177454). On submerged rotten leaves of *Pandanus helicopus*.

Fusarium pandani (Corda) Sacc., *Syll. Fung. 4*: 724, 1886.
≡ *Fusisporium pandani* Corda, *Icon. Fung. 1*: 11, 1837.
Czechoslovakia, near Reichenberg. On decaying leaves of *Pandanus*.

Fusisporium pandani Corda
See *Fusarium pandani* (Corda) Sacc.

Gliomastix macroelata Matsush., *Matsushima Mycol. Mem. 4*: 9, 1985.
Japan, Okinawa Pref., Iriomote Island, 7 Feb 1985, T. Matsushima (MFC 12863). From dead leaf of *Pandanus* sp.

Haplaria pandani Gutner, **Trudy Bot. Inst. Akad. Nauk SSSR, Ser 1, Fl. Sist. Vysš. Rast. 1*: 313, 1933.
Russia. On leaves of *Pandanus utilis* cultivated in greenhouse.

Hemicorynespora naviculiformis Matsush., *Matsushima Mycol. Mem. 2*: 11, 1981.
Palau, Airai, 1980, T. Matsushima (MFC 10438). On dead leaf of *Pandanus* sp.

Kodonospora tetracolumnaris K. Ando, *Mycol. Res. 97*: 506, 1993.
Japan, Tokyo, Ogasawaramura, Kitaiou Island, 14 Jul 1985, T. Sato (TNS-F-176499). On dead leaves of *Pandanus boninensis*.

Monodictys pandani Matsush., *Matsushima Mycol. Mem. 4*: 12, 1985.
Caroline Islands, Palau, Airai, 25 Sep 1980, T. Matsushima (MFC 10439). From dead leaf of *Pandanus*.

Oedemium sparsum Berk. & Broome, *J. Linn. Soc. 14*: 100, 1875.
Sri Lanka, No. 431. On *Pandanus odoratissimus*.

Oospora macrotricha (Corda) Sacc. & Voglino in Sacc., *Syll. Fung. 4*: 24, 1886.
≡ *Torula macrotricha* Corda, *Icon. Fung. 1*: 8, 1837.
Czechoslovakia, near Reichenberg and Germany, Pfaueninsel, near Potsdam. On decaying leaves of *Pandanus*.

Paecilomyces iriomoteanus Matsush., *Icon. Microfung. Matsushima Lect.*: 105, 1975.
Japan, Okinawa, Iriomote Island, Feb 1972, T. Matsushima (MFC 4254). On a dead leaf of *Pandanus tectorius* var. *liukiuensis*.

Pleurophragmium hippotrichoides (Corda) M.B. Ellis, *More Demat. Hypho.*: 164, 1976.
≡ *Chloridium hippotrichoides* Corda, *Icon. Fung. 1*: 17, 1837.
Germany, near Berlin and Czechoslovakia, Reichenberg. On decaying leaves of *Pandanus sylvestris*.

Polyactis olivacea Corda
See *Botrytis olivacea* (Corda) Sacc.

Sclerotium hypocreaemorphum Ces., *Atti Accad. Sci. Fis. 8*: 27, 1879.
Malaysia, Sarawak, 1865. On fibrous pericarp of *Pandanus ?inspersum*.

Solheimia kamatii Varghese & V.G. Rao, *Curr. Sci. 46*: 23, 1977.
India, Kerala, Wynaad, 20 Jun 1976, K.I. Mani Varghese (AMH 2869). On dead leaves of *Pandanus* sp.

Sporotrichum oligocarpum (Corda) Rabenh., *D.C. Fl. No. 744.*
≡ *Capillaria oligocarpa* Corda, *Icon. Fung. 1*: 10, 1837.
Germany, Berlin and Czechoslovakia, near Reichenberg. On decaying leaves of *Pandanus sylvestris*.

Torula macrotricha Corda
See *Oospora macrotricha* (Corda) Sacc. & Voglino.

Triscelophorus ponapensis Matsush., *Matsushima Mycol. Mem. 2*: 19, 1981.
Federated States of Micronesia, Pohnpei, Madolenihmw, 23 Nov 1976, T. Matsushima (MFC 7002). On decayed leaves of *Pandanus* sp.

Volutella mellea J.F. Clark, *Bull. Torrey Bot. Club 26*: 619, 1899.
North America. On dead leaves of *Pandanus veitchi* in greenhouse.

Volutella minima Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 118*: 1543, 1909.
Indonesia, Java, in Tjibodas woods, 1908. On decaying leaves of *Pandanus* sp. According to Samuels (1977) the sporodochia of this species are morphologically identical to those of *Volutella ciliata* Fr. and to the conidial state of *Nectria consors* (q.v.).

Volutellaria fuliginea I. Hino & Katum., *Bull. Fac. Agric. Yamagata Univ. 15*: 515, 1964.
Japan. On *Pandanus tectorius* var. *liukiuensis*.

Coelomycetes described from Pandanus

Annellolacinia pandanicola J. Fröhl., Raga, Philemon & K.D. Hyde, *Mycol. Res. 97*: 1434, 1993.
Australia, North Queensland, Kuranda, Saddle Mountain, 9 Feb 1992, J. Fröhlich & K.D. Hyde (BRIP 20431). On living leaf of *Pandanus* sp.
Ceuthospora olivacea Corda, *Icon. Fung. 1*: 24, 1837.
Czechoslovakia, Reichenberg. On decaying leaves of cultivated *Pandanus odoratissimus*.
Although treated as an ascomycete by Corda, it is apparent that this species is a coelomycete in the conserved genus *Ceuthospora* Grev. (1827). Nag Raj (1993) stated that the type is not in PR, B, or PC.
Ceuthospora pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 468, 1932.
Western Samoa, Upolu, 1 Aug 1929, Christophersen 525. On dry fruit of *Pandanus odoratissimus* var. *upolensis*.
Colletotrichum pandani Syd. & P. Syd., *Philipp. J. Sci. 8*: 282, 1913.
Philippines, Luzon, Manila, 5 Oct 1912, E.D. Merrill S 33. On young leaves of *Pandanus veitchi*.
Coniothyrium pandanicola (as *pandanicolum*) Petr., *Sydowia 7*: 401, 1953.
U.S.A., Hawaii, Honolulu, 4 Feb 1928, No. 427. On cultivated *Pandanus* sp.
Coniothyrium perottianum Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 469, 1932.
Samoa, leg. Christophersen 912, 2828; Savaii, 13 Nov 1931, No. 2819. On dry leaves of *Pandanus macfarlanei*, *P. odoratissimus* var. *upolensis*, *P. tagaensis*.
Cytospora pandani Prill. & Delacr., *Bull. Soc. Mycol. France 9*: 273, 1893.
France, Versailles, National School of Horticulture. On upper surface of leaves of *Pandanus utilis* in greenhouse.
Diplodia fructus-pandani Henn., *Hedwigia 47*: 264, 1908.
Philippines, Luzon, Prov. Bataan, Lamao, Jan 1904, E.D. Merrill. On fruit of *Pandanus luzonensis*.
Diplodia fructus-pandani Henn. f. ***foliorum*** Sacc., *Atti Accad. Sci. Veneto-Trentino-Istriana, Ser. 3, 10*: 76, 1917.
Philippines, Los Baños, S.A. Reyes. On dead leaf sheaths of *Pandanus* sp.
Diplodia pandani Tassi, *Bull. Lab. Orto Bot. Reale Univ. Siena 2*: 155, 1899.
Madagascar. On dry fruit of *Pandanus utilis*.
Diplodina pandani Tassi, *Bull. Lab. Orto Bot. Reale Univ. Siena 2*: 156, 1899.
Italy. On dead leaf sheath of *Pandanus utilis* in botanical garden.
Dothiorella maculosa Sacc., *Atti Accad. Sci. Veneto-Trentino-Istriana, Ser. 3, 10*: 72, 1917.
Philippines, Los Baños. On dead leaves of *Pandanus sabotan*.
Gloeosporium pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 472, 1932.
Western Samoa, Upolu, Aug 1929, Christophersen 381. On dry pericarp of *Pandanus lambooensis* (as *lanutooensis*).
Groveolopsis pandani (Höhn.) Boedijn, *Sydowia 5*: 225, 1951.
  ≡ *Septoriopsis pandani* Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math-Naturwiss. Kl., Abt. 1, 129*: 168, 1920.
  ≡ *Rhabdospora pandani* (Höhn.) Petr., *Sydowia 5*: 225, 1951.

Indonesia, Java, Buitenzorg, Botanical Gardens, 1907. On dead leaves of *Pandanus* sp. (holotype in FH).

Harknessia pandani Sawada, *Special Publ. Coll. Agric. Natl. Taiwan Univ. 8*: 160, 1959.

Taiwan, Pref. Taitung, Fukang, May 1921, K. Sawada. Pref. Ilan, Chingmien, May 1923, K. Sawada. On leaves of *Pandanus odoratissimus*.

This species was described without a Latin diagnosis, and therefore is invalid under Article 36.1 of the Botanical Code.

Lasiodiplodia abnormis Traverso & Spessa, in litt. (see Saccardo 1913).

São Tomé and Principe, Rodia, 550m. On fallen and attached, withered fruit of *Pandanus thomensis*.

Macrophoma pandani (Lév.) Berl. & Voglino

See *Metadiplodia pandani* (Lév.) P. Joly.

Macrophoma pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 465, 1932, non *M. pandani* (Lév.) Berl. & Voglino.

Samoa (Savaii, Tutuila, Upolu), Palau, French Polynesia (Tahiti), U.S.A. (California). On dry fruit of *Pandanus* spp.

Macrophomella pandani Died., *Ann. Mycol. 14*: 63, 1916.

Philippines, Mt Maquiling, 1 Apr 1914, C.F. Baker 3160. On fruit of *Pandanus luzoniensis*.

Melanconium merrillii Syd. & P. Syd., *Philipp. J. Sci. 8*: 506, 1913.

Philippines, Luzon, Manila, E.D. Merrill. On dead leaves of *Pandanus tectorius*.

Melanconium pandani Lév., *Ann. Sci. Nat. Bot., Sér. 3, 3*: 66, 1845.

France, Paris, botanical gardens, greenhouse. On trunk and leaves of dead *Pandanus*.

Melanconium pandanicola Sawada, *Special Publ. Coll. Agric. Natl. Taiwan Univ. 8*: 179, 1959.

Taiwan, Pref. Pingtung, Kangou, 24 Apr 1931, K. Sawada. On branches of *Pandanus odoratissimus*.

This species was described without a Latin diagnosis, and therefore is invalid under Article 36.1 of the Botanical Code.

Metadiplodia pandani (Lév.) P. Joly, *Bull. Soc. Mycol. France 81*: 280, 1965.

≡ *Sphaeropsis pandani* Lév., *Ann. Sci. Nat. Bot., Sér. 3, 5*: 293, 1846.
≡ *Phoma pandani* (Lév.) Sacc., *Syll. Fung. 3*: 157, 1884.
≡ *Macrophoma pandani* (Lév.) Berl. & Voglino, *Atti Soc. Veneto-Trentino Sci. Nat. Padova 10*: 184, 1886.

Leg. Gaudichaud (PC). On fruit of *Pandanus*.

Pestalotia (as *Pestalozzia*) ***pandani*** Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 473, 1932.

Cook Islands, Rarotonga, 1 Aug 1929, P. Wilder 13. Australia, Stradbroke Island, 1930, A.F. White 6710. Loyalty Islands. On dry fruit of *Pandanus tessellatus*, *P. pedunculatus* var. *stradbrookeensis*, *P. pedunculatus* f. *lofuensis*.

Pestalotia (as *Pestalozzia*) ***pandani*** Sawada, **J. Taihoku Soc. Agric. 7*: 114, 1942.

Taiwan. On *Pandanus odoratissimus*.

This species was described without a Latin diagnosis and therefore is invalid under Article 36.1 of the Botanical Code.

Pestalotia (as *Pestalozzia*) ***peyronelii*** Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 474, 1932.

Australia, Stradbroke Island. On dry fruit of *Pandanus pedunculatus* var. *stradbrookeensis*.

Phoma fructus-pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 464, 1932.

Samoa, leg. Christophersen 625. On dry fruit of *Pandanus reineckei*.

Phoma martellii Verona, *Nuovo Giorn. Bot. Ital. n.s. 39*: 465, 1932.

Samoa, leg. Garber 984. On dry fruit of *Pandanus calostigma* var. *samoana*.

Phoma pandani (Lév.) Sacc.

See *Metadiplodia pandani* (Lév.) P. Joly.

Phoma pandani Verona, *Nuovo Giorn. Bot. Ital. n.s. 38*: 536, 1931, non *P. pandani* (Lév.) Sacc.

French Polynesia, Marquesas Islands, Nukuhiva, leg. Dalmas. On leaves of *Pandanus odoratissimus*.

Phomopsis pandani Died., *Ann. Mycol. 14*: 191, 1916.

India, Poona, 6 Jul 1908, H.M. Chibber (E.J. Butler 1774). On leaves of *Pandanus* sp.

Phyllosticta pandanicola E. Young, *Mycologia 7*: 150, 1915.

Puerto Rico, Santurce, 1912-13, F.L. Stevens. On leaves of *Pandanus* sp.

Pirostoma farnetianum Pollacci, **Atti Ist. Bot. Univ. Pavia, Ser. 2, 5*: 5, 1897.

Italy, Ticinensi. On living leaves of *Pandanus utilis* in botanical garden.

Plenodomus inaequalis Sacc. & Trotter

See *Stilbophoma inaequalis* (Sacc. & Trotter) B. Sutton.

Pycnothyrium pandani Syd. & P. Syd., *Philipp. J. Sci. 9*: 187, 1914.

Philippines, Palawan, Taytay, Apr 1913, E.D. Merrill 8766, 8844. On dead leaves of *Pandanus tectorius*.

Rhabdospora pandani (Höhn.) Petr.

See *Groveolopsis pandani* (Höhn.) Boedijn.

Septoriopsis pandani Höhn.

See *Groveolopsis pandani* (Höhn.) Boedijn.

Sphaeropsis pandani Lév.

See *Metadiplodia pandani* (Lév.) P. Joly.

Sphaeropsis pandani Henn., *Hedwigia 67*: 263, 1908, non *S. pandani* Lév.

Philippines, Mindanao, Davao, Mar 1904, E.B. Copeland 592. On dried leaves of *Pandanus laevis*.

This species has the same collection details as *Linocarpon pandani*.

Stilbophoma inaequalis (Sacc. & Trotter) B. Sutton, *Coelomycetes*: 558, 1980.

≡ *Plenodomus inaequalis* Sacc. & Trotter, **Bull. Soc. Roy. Bot. Belgique 38*: 167, 1899.

Zaire, Devèvre (IMI 187914). On dead leaves of *Pandanus* sp.

Vermicularia pandani Syd. & P. Syd., *Leafl. Philipp. Bot. 5*: 1546, 1912.

Philippines, Palawan, Puerto Princesa. On the base of aged leaves of *Pandanus reclinatus*.

Myxomycetes described from *Pandanus*

Badhamia fasciculata (Jungh.) Rostaf.
See *Physarum fasciculatum* Jungh.
Physarum fasciculatum Jungh., *Praem. Fl. Crypt. Java*: 11, 1838.
≡*Badhamia fasciculata* (Jungh.) Rostaf., *Sluzowce Monogr., Suppl.*: 2, 1876.
Indonesia, Java, near Depok. On trunk of *Pandanus*.
Identity uncertain. Given as a doubtful synonym of *P. reniforme* G. Lister (Lister 1925) and of *P. compressum* Alb. & Schwein. (Martin & Alexopoulos 1969).

Acknowledgements

Mr Nick Waipara, AgResearch, Hamilton, New Zealand kindly reviewed this paper. Funds for this research were provided by the Foundation for Research, Science and Technology under Contract Number C09309.

References

Arnaud, G. 1931: Les Astèrinées. VII. *Annales de Cryptogamie Exotique 4*: 74-97.

Bridson, G.D.R.; Smith, E.R. 1991: *Botanico-Periodicum Huntianum / Supplementum*. Pittsburgh, Hunt Institute for Botanical Documentation.

Corda, A.C.J. 1837: *Icones Fungorum Hucusque Cognitorum*. Prague, J.G. Calve.

Cunningham, G.H. 1944: *The Gasteromycetes of Australia and New Zealand*. Dunedin, John McIndoe.

Ehrenberg, C.G. 1820: Fungos a viro clarissimo Adalberto de Chamisso, sub auspiciis Romanzoffianis in itinere circa terrarum globum collectos, enumeravit novosque descripsit et pinxit. In Nees ab Esenbeck, C.G. *Horae Physicae Berolinenses*, 77-104, pl. 17-20. Bonnae, Sumptibus Adolphi Marcus.

Fries, E. 1838: *Epicrisis Systematis Mycologici*. Uppsala, Typographia Academica.

Hennings, P. 1898: Die in den Gewächshäusern Botanischen Gartens beobachteten Pilze. *Verhandlungen des Botanischen Vereins der Provinz Brandenburg 40*: 109-177.

Hennings, P. 1908: Fungi Philippinenses I. *Hedwigia 47*: 250-265.

Holmgren, P.K.; Holmgren, N.H.; Barnett, L.C. 1990: *Index Herbariorum. Part I: The Herbaria of the World*. New York, Botanical Garden.

Hyde, K.D. 1995: Fungi from palms. XXII. The genus *Seynesia*. *Sydowia 47*: In Press.

Kirk, P.M. 1985: Saccardo's Omissions. *Index of Fungi Supplement*. Kew, Commonwealth Mycological Institute.

Kirk, P.M.; Ansell, A.E. 1992: Authors of fungal names. *Index of Fungi Supplement*. Wallingford, C.A.B. International.

Lawrence, G.H.M.; Buchheim, A.F.G.; Daniels, G.S.; Dolezal, H. 1968: *Botanico-Periodicum-Huntianum*. Pittsburg, Hunt Botanical Library.

Lister, G. 1925: *A Monograph of the Mycetozoa*. Ed. 3. London, British Museum (Natural History).

Mabberley, D.J. 1987: *The Plant-Book*. Cambridge, University Press.

McKenzie, E.H.C. 1995: Dematiaceous hyphomycetes on Pandanaceae. 5. *Sporidesmium* sensu lato. *Mycotaxon*. In Press.

Martin, G.W.; Alexopoulos, C.J. 1969: *The Myxomycetes*. Iowa, University of Iowa Press.

Miller, J.H. 1961: *A Monograph of the World Species of* Hypoxylon. Athens, University of Georgia Press.

Nag Raj, T.R. 1993: *Coelomycetous Anamorphs with Appendage-Bearing Conidia.* Waterloo, Mycologue Publications.

Rossman, A.Y.; Samuels, G.J.; Lowen, R. 1993: *Leuconectria clusiae* gen. nov. and its anamorph *Gliocephalotrichium bulbilium* with notes on *Pseudonectria*. *Mycologia 85*: 685-704.

Saccardo, P.A. 1913: *Sylloge Fungorum 22*.

Samuels, G.J. 1977: *Nectria consors* and its *Volutella* conidial state. *Mycologia 69*: 255-262.

Singer, R. 1973: A monograph of the neotropical species of *Marasmiellus. Beihefte zur Nova Hedwigia 44*: 1-339.

Stafleu, F.A.; Cowan, R.S. 1976-88: *Taxonomic Literature*. Ed. 2, 7 vols. Utrecht, Bohn, Scheltema & Holkema.

Willis, J.C. 1973: *A Dictionary of the Flowering Plants and Ferns*. Ed. 8. Cambridge, University Press.

MYCOTAXON

Volume LVII, pp. 145-149 January-March 1996

CIRCINELLA LACRYMISPORA SP. NOV. A NEW MUCORAL ISOLATED FROM ARGENTINE SOILS

A.M. Arambarri* and M.N. Cabello**
Instituto de Botànica "Spegazzini", 53 # 477, 1900 La Plata, Argentina.

Summary

A new species of *Circinella*, namely *C. lacrymispora*, isolated from hydrocarbon polluted soil sampled in Ensenada (Buenos Aires Province, Argentina), is described and illustrated. A new combination is proposed: *Fennelomyces naumovi comb. nov.*

Exsiccata are available at the Spegazzini Institute (LPS).

Upon examination of soil fungi growing in hydrocarbon polluted soils from Ensenada (Buenos Aires Province, Argentina) special attention was paid to a species of the genus *Circinella.* A study of the characteristics on culture media demonstrated that this species does not belong to any species formerly described and it should be considered as a new one. It was isolated from soil using the soil washing technique (Parkinson & Williams 1961). The description is made from observations on malt extract agar (MEA).

The genus *Circinella* was erected by van Tieghem & Le Monnier in 1873. It includes species closely related to *Mucor* but differing by the production of sporangiophores with circinate branches. Hesseltine & Fennell (1955) recognized 7 species and described a new one namely *C. linderi.* We agree with Naganishi (1974) who compared *C. chinensis* and *C. mucoroides* and concluded that both have different morphological and physiological characteristics, for these reasons *C. chinensis* is a valid species following him.

Benny and Benjamin (1975) erected a new genus *Fennellomyces* to reubicate *C. linderi.* This species has two different kinds of sporangia: large, terminal, columellate, multisporate and apophysate sporangia and multispored, rarely 1-spored sporangiola, and supported by a recurved and branched sporangiophore.

---

* Researcher of the Consejo Nacional de Investigaciones Cientìficas y Técnicas (CONICET), Argentina.

**Researcher of the Comisiòn de Investigaciones Cientìficas de la Provincia de Buenos Aires (CICPBA), Argentina.

Since the publication of those works there has been no new valid description or revision of the genus *Circinella*, although *C. indica* was erected by Patil & Kale, but not validly published, art. 37 IBCN (Index of fungi 1982,vol.5 part.4).

In this paper *Circinella lacrymispora* nov. sp. is described and a key of the species of the genus is presented. *C. naumovi* is revised and a new combination is proposed.

SPECIES DESCRIPTION

Circinella lacrymispora nov. sp. fig. 1-5.

Coloniae late effusae, albae, pallide olivaceae. Sporangiophora monotypica, 500-1000 µm alta, 5-8 µm diam., sympodialiter ramosa. Sporangia circinata globosa, 36-45 µm diam., collumnis globosis 9-10 µm diam. Sporangiosporae in magnitudine uniformes, obovoidea-obclaviformis 6-8 x 2,7-3 µm ad basin, 0,9-1 µm ad apicem, laevia hyalina. Zygosporae ignotae.

Holotypus: ARGENTINA, Buenos Aires, Ensenada, leg. M.N. Cabello, VI/1994, colonia exsiccata in culture, LPS 55.

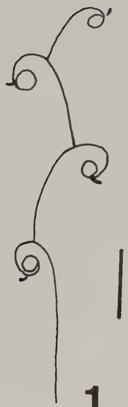
Etymology: *from latin lacryma: tear; referring to the shape of the sporangiospores.*

Colonies on MEA restricted, reaching 5 cm after 10 days, at first white, then pale olive, usually effuse, reverse at first white after 10 days avellanous. Sporangiophores up to 1 mm long, 5-8 µm diam., nonseptate, hyaline, sympodially branched, fertile branches circinate, bearing single sporangia, with alternate arrangement; with sterile spines at the sporangial base, without rhizoid-like structures. Sporangia globose typically 36-40 µm diam., globose, hyaline, smooth. Sporangiospores obovoid-obclaviform, smooth, hyaline, 6-8 x 2,7-3 at the base and 0,9-1 µm at apex. Zygospores unknown.

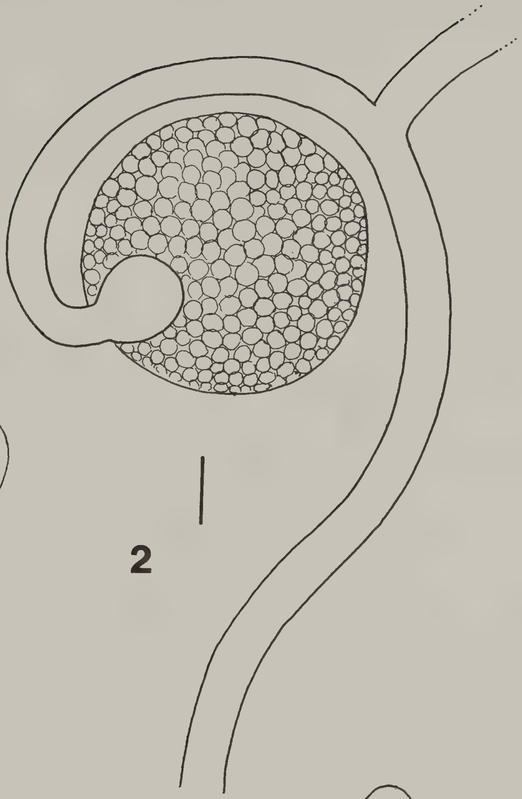
This species may be distinguished from other species of *Circinella* by its spore shape, and sympodial arrangement of the circinate branches. It is close to *C. chinensis* Naganishi et Kojiro (CBS 140.28), with a similar shape, arrangement of the sporangiophores and sporangia and the presence of sterile spines, but differs by the size and shape of the spores. We have also compared the culture of *C. lacrymispora* with the culture of *C. simplex* van Tieghem

---

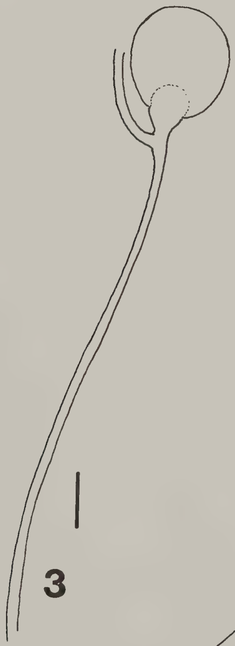
Figures 1-6 *Circinella lacrymispora*. Fig. 1. sporangiophores circinate with spines; fig. 2 & 3. Sporangium with columellae; fig.4. columellae; fig. 5. sporangiospores.
Bars represent 100µm in 1; 10µm in 2 & 4; 20µm in 3 and 5µm in 5.



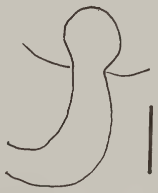
1



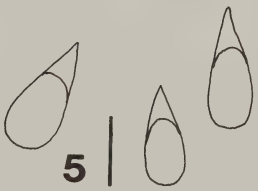
2



3



4



5

(CBS 142.35), the latter having irregular spores and laking sterile spines.

Fennellomyces naumovii (Mil'ko) *comb.nov.*
≡ *Circinella naumovii* Mil'ko Novosti Sist. Nizsh. Rast. 6: 96.

Sporangiphores simple or sympodially branched, arising directly from the subtrate mycelium. Tall sporangiophores producing one large terminal sporangia and lateral sporangiola borne on circinate pedicels.
Material examined culture CBS 514.68

Key to the species of *Circinella*

A.- Sporangia arranged in umbels on the sporangiophore B.
  B.- At least 8 or 10 sporangia per umbel
    1.- *C. umbellata*
  B'.-Not more than 4 or 5 sporangia per umbel
    2.- *C. minor*
A'.- Sporangia not arranged in umbels C.
  C.- Sporangial wall breaking and leaving a large saucer-like collar
    3.- *C. angarensis*
  C'.- Sporangial wall not with the above characteristics D.
    D.- With sterile spines on differents parts of the sporangiophore E.
      E.- Spines along the sporangiophore, not on the branches
        4.- *C. mucorioides*
      E'.-Spines on the branches supporting the sporangia F
        F. With twisted steril hyphae
          5.- *C. chinensis*
        F'. Without twisted steril hyphae..........G
          G. Sporangiospores globoses
            6.- *C. muscae*
          G'.- Sporangiospores obconic, regularly shaped
            7.-*C. lacryspora*
    D'.- Without sterile spines H
      H.- Sporangial wall very hard and rigid
        8.- *C. rigida*
      H'.-Sporangial wall dehiscent
        9.- *C. simplex*

ACKNOWLEDGEMENTS

We are grateful to Dr. Jorge E. Wright (Departamento de Ciencia Biològicas U.B.A.), Dr. Irma J. Gamundi de Amos (Centro Regional Universitario Bariloche, U.N.C.) for the critical review of the manuscript, Mrs. N. Malacalza for inking the draw. Mrs F.B. Snippe-Claus from CBS is thanked for sending the cultures. We also wish to thank the financial support from Comisiòn de Investigaciones Cientificas Prov. Bs. As. for the research "Bioremediation *in situ* of hydrocarbon polluted soils" 1994.

REFERENCES

Benny G.L. & R.K. Benjamin. 1975. Observations on *Thamnidiaceae (Mucorales)*. New taxa, new combinations and notes on selected species. Aliso 8 (3):301-351.

Hesseltine C.W. & D.I. Fenell. 1955. The genus *Circinella*. Mycologia 47(2): 193-212.

Naganishi, H. 1974. On a *Circinella* species isolated from Korean yeast cake (Kyokusi). Trans.Mycol.Soc. Japan 15:175-177.

Parkinson, D. & S.T. Williams. 1961. A method for isolating fungi from soil microhabitats. Plant and soil 13: 347-355.

MYCOTAXON

Volume LVII, pp. 151-153 January-March 1996

A NEW SPECIES OF *PARMELIA* (LICHENIZED ASCOMYCOTINA) FROM THE ANTARCTIC

DAG O. ØVSTEDAL

Botanical Institute, University of Bergen, Allégaten 41, N-5007, Norway

JOHN A. ELIX

Department of Chemistry, The Faculties, Australian National University, Canberra, ACT 0200, Australia

RONALD I. LEWIS SMITH

British Antarctic Survey, Madingly Road, Cambridge, CB3 0ET, England

ABSTRACT : A new species of *Parmelia* (lichenized Ascomycotina) from the Antarctic. *Parmelia lindsayana* Øvstedal & Elix from Signy Island (South Orkney Islands) is described as new. This species resembles *P. protosulcata* Hale and *P. cunninghamii* Crombie, but differs in morphological details and in containing usnic, α-collatolic and alectoronic acids.

Introduction

During a study of the lichen flora of Signy Island (South Orkney Islands, Antarctica), a *Parmelia* species was found which could not be identified with any known species. This species is here described as new. Anatomical and chemical investigations follow standard methods.

Parmelia lindsayana Øvstedal & Elix, sp. nov.

Species cum thallo ut in *Parmelia cunninghamii* sed ab hac specie lobis sublineariter, angustioribus et acidum alectoronicum et acidum α-collatolicum continente differt.

Type: South Orkney Islands. Knife Point, Borge Bay, Signy Island, 60°43'S, 45°02'E, 10 m elevation; on mosses on cliff ledges, 8 October 1966, *D. C. Lindsay 1262* (holotypus: AAS).

Thallus saxicolous, firm, adnate, yellow-grey, pale brownish-grey, reddish-brown to dark mineral grey or blackened, 2-5 cm diam. *Lobes* sublinear, short, contiguous or ascending at the margins, 2-3 mm wide. *Upper surface* shiny but becoming dull and blackening with age, plane to rugose-foveolate with age, reticulately fissured only in the older parts, sorediate, the soralia linear along the margins, orbicular when laminal, soredia becoming grey-black, coarse, granular, becoming partially corticate and subisidiate; pseudocyphellae effigurate, laminal, moderate, punctiform or curved, most prominent on the marginal lobes. Medulla white. *Lower surface* moderately to densely rhizinate, the rhizines simple to sqarrosely branched, 1-2 mm long. *Pycnidia* rare, marginal; conidia cylindrical, 5.5-7.0 x 1 µm. Apothecia not seen.
Chemistry: Cortex K+ yellow; medulla K-, C-, KC+ pink, P-, UV+ bluish-white; containing atranorin, chloroatranorin, usnic acid, α-collatolic acid (major), alectoronic acid (minor).

P. lindsayana has affinities with *P. cunninghamii* but is distinguished by the narrower (2-3 mm wide), sublinear lobes, the coarser soredia, cortical usnic acid and medullary alectoronic and α-collatolic acids. *P. cunninghamii* develops similar soralia but has broader (3-6 mm wide), irregular lobes with rotund apices and contains medullary salazinic and consalazinic acids. Furthermore the soredia are much finer and farinose in *P. cunninghamii. P. lindsayana* also resembles *P. protosulcata,* particularly in the coarse soredia which becomes partially corticate (sorediate-isidia). However *P. protosulcata* has still narrower lobes (1-3 mm wide) and differs chemically from *P. lindsayana* in containing medullary protocetraric acid. Usnic acid is very rare in *Parmelia* sensu stricto, being known only from the Euroasian species, *P. fraudans,* while alectoronic acid and α-collatolic acid have not been observed in any other *Parmelia* species.

This new species appears to grow in moss tufts (mainly *Andreaea* spp.) in sheltered habitats and may in the field have been overlooked as small specimens of *P. sulcata* Taylor or *P. saxatilis.*

Earlier, only *Parmelia saxatilis* (L.) Ach. was known from the Antarctic area (see Lindsay 1973) but subsequently both *P. saxatilis* and *P. sulcata* were found in South Georgia (Lindsay 1974). *P. lindsayana* represents a further species from the region. Recently Stenroos (1991) reported *P. cunninghamii, P. protosulcata, P. saxatilis, P. kerguelensis* Wilson (which was considered a chemotype of *P. saxatilis*) and *P. sulcata* in Tierra del Fuego, where the larger number of species reflects a greater variety of habitats.

LITERATURE CITED

Hale, M. E. (1987). A monograph of the lichen genus *Parmelia* Acharius sensu stricto (Ascomycetinae: Parmeliaceae). *Smithsonian Contributions to Botany* **66**: 1-65.

Lindsay, D. C. (1973). Notes on Antarctic lichens: VII. The genera *Cetraria* Hoffm, *Hypogymnia* (Nyl.) Nyl., *Menegazzia* Massal., *Parmelia* Ach. and *Platismatia* Culb. & Culb. *British Antactic Survey Bulletin* **36**: 105-114..

Lindsay, D. C. (1974). The macrolichens of South Georgia. *British Antarctarctic Survey Scientific Reports* **89**: 1-91.

Stenroos, S. (1991). The lichen genera *Parmelia* and *Punctelia* in Tierra del Fuego. *Annals Botanica Fennica* **28**: 241-245.

MYCOTAXON

Volume LVII, pp. 155-162 January-March 1996

CALVATIA COMPLUTENSIS sp.nov. (*LYCOPERDACEAE, GASTEROMYCETES*) FROM SPAIN.

G. MORENO (1), H. KREISEL (2) & A. ALTÉS (1)

(1) Dpto. Biología Vegetal, Universidad de Alcalá, 28871 Alcalá de Henares,
Madrid, Spain.

(2) Ernst-Moritz-Arndt-Universität, Fachbereich Biologie, Institut für
Mikrobiologie und Molekularbiologie, D-17487 Greifswald, Germany.

SUMMARY: *Calvatia complutensis*, a new species from Spain, is described and illustrated by SEM photography.

Key words: *Calvatia complutensis*, *Gasteromycetes*, taxonomy.

In 1986, and for the first time, we found (G. M. and A. A.) a single basidiocarp of a member of the *Lycoperdaceae* unknown to us. This specimen was collected on the campus of the Universidad de Alcalá, prov. Madrid, by one of our students of biology. Immediately, we were convinced that its characters did not fit any other species described in *Calvatia* and related genera. A few years later, we had the opportunity to compare our material with some samples of *Calvatia bicolor* (Lév.) Kreisel from Baja California, Mexico. The macroscopic similarity of both taxa was striking, but they revealed different microscopic characters. In 1991, another basidiocarp, similar to the previous one, was found in the neighbourhood of Alcalá de Henares, and, three years later, a third fruitbody showed up near the Universidad de Alcalá. Recently, we have studied two additional collections, both found in Pinto, prov. Madrid, approximately 50 km distant from the localities mentioned above, and conserved in the herbarium MA-Fungi. In view of the repeated collections in the province of Madrid and the constancy of the macro- and microscopical characters, we propose to attribute the collections to a new species with the name *Calvatia complutensis*.

For the present, 4 species of *Calvatia* have been recorded from Spain (CALONGE 1990), to which we now add the new taxon described below.

MATERIAL AND METHODS

The material of *Calvatia complutensis* described below is conserved in the herbaria of the Universidad de Alcalá, Alcalá de Henares, Madrid, Spain (AH), and of the Real Jardín Botánico, Madrid, Spain (MA-Fungi).

The gleba colour was determined by comparison with the Natural Colour Guide of LOCQUIN (1975) with the corresponding codes in parenthesis. The photographs by light microscope (LM) and by scanning electron microscope (SEM) were carried out with the methods indicated by MORENO *et al.* (1995).

Calvatia complutensis **G. Moreno, Kreisel & Altés,** ***sp. nov.*** FIGS. 1-13

Etymology: *Compluto, nomen antiguum urbis* Alcalá de Henares (= *locus typi*).

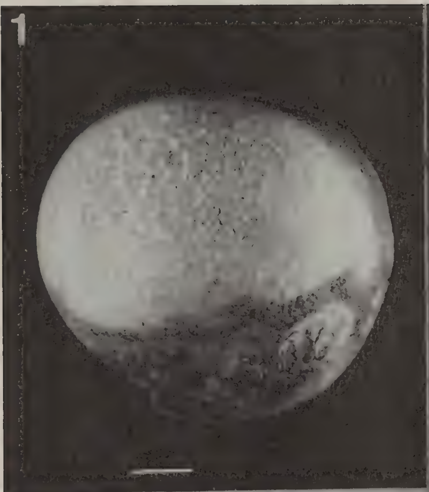
Carposoma ad 70 mm *altum, subglobosum, basi rotundatae sedens, in maturitate mycelio dehiscens. Exoperidium albidum, cremeum, glabrum, leve, deinde areolatum, tenue. Endoperidium rigidum, coriaceum,* 0.5 *ad* 1.5 mm *crassum, castaneum, nigrescens, opacum. Gleba matura olivaceobrunnea, pulverulenta. Subgleba nulla.*

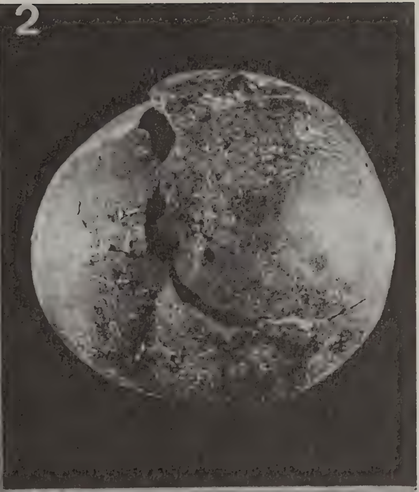
Basidiosporae ovoideae-subglobosae, in microscopio optico subleves, in microscopio electronico leviter rugosae, apedicellatae, (3.2-)4.8-5.6(-6.4) µm *longae, in cumulo obscure olivaceobrunneae. Capillitium modo generis Lycoperdon ramificatum, regulariter septatum, fragile; hyphae ad septa ruptae, dichotomae, parietibus crassiusculis poris sparsis conspicuis circularibus instructae.*

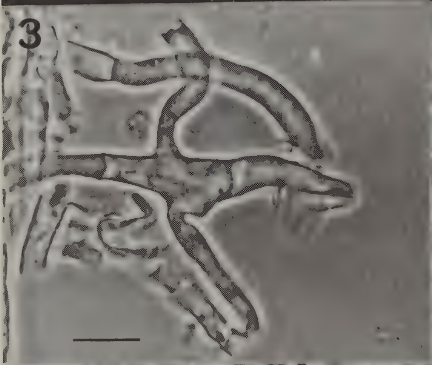
Habitat: Locis cultis et ruderalibus Hispaniae centralis, ca. 600-625 m.s.m.

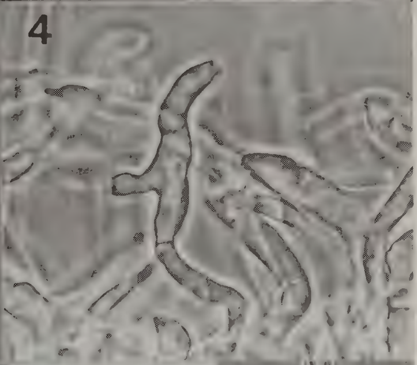
Locus typi: Hispania, prov. Madrid, Alcalá de Henares, *in campo Universitatis, leg.* J. Sánchez, 24.VII.1986. ***Holotypus*** *in herbario* AH 13238 *conservatur.*

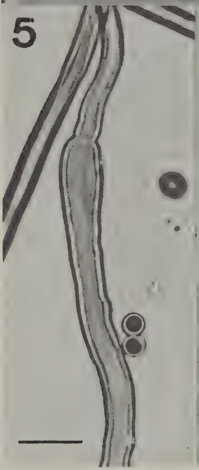
FIGS. 1-8. *Calvatia complutensis* Moreno, Kreisel & Altés AH 13238 HOLOTYPE. 1, 2. Basidiocarp showing the dirty white exoperidium and the irregular rupture of the endoperidium. 3, 4. Filaments of exoperidium. 5-8. Capillitium. Scale bars: 1, 2 = 10 mm; 3-8 = 10 µm.

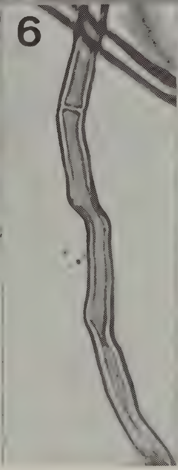

1

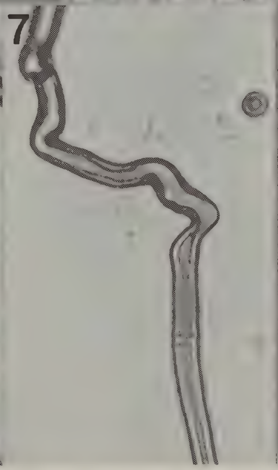

2

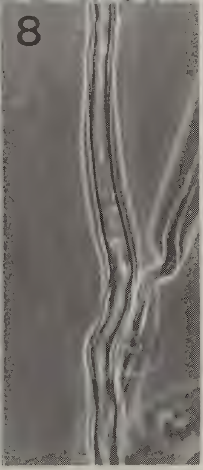

3


4


5


6


7


8

Basidiocarp 23-70 mm diam, globose or pear-shaped, separated from the basal mycelium when mature to roll freely on the ground. *Exoperidium* thin, dirty white, breaking into small polygonal plates when mature (fig. 1). *Endoperidium* 0.5-1.5 mm thick, smooth, coriaceous, fragile, rupturing irregularly from the apex (Fig. 2), fulvous to dark brown or bronze brown (sometimes striking coppery brown), opaque; sometimes small orifices, caused apparently by insects, are present. *Gleba* dark olivaceous brown (A2b). *Subgleba* absent.

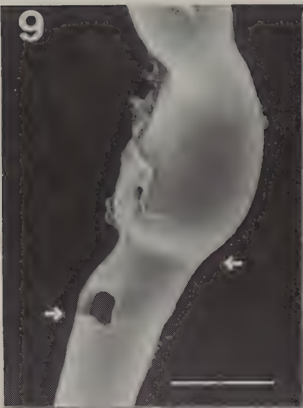
Basidiospores (3.2-)4.8-5.6(-6.4) µm diam, globose to ovoid, ochraceous, under LM glabrous with a small hyaline apiculus 0.5 to 1.2 µm long; under SEM showing a rugose to very fine verruculose ornamentation (figs. 12, 13). *Capillitium* abundant, 3-5.5 µm diam, with moderately thick walls (up to 1 µm) surface with infrequent circular pits of medium size (figs. 9, 10), dichotomously ramified, frequently septate (rupturing at the septa), sometimes somewhat sinuous (fig. 7), yellowish to olivaceous brown, not enlarged at the septa although sometimes the filaments are slightly broader at one side of a septum (figs. 5, 9, 11). *Exoperidium* formed by interwoven filaments, 3-6 µm diam, hyaline, septate without clamps, ramified (figs. 3, 4), with some cells of variable morphology (claviform or subglobose), enlarged to 12 µm diam.

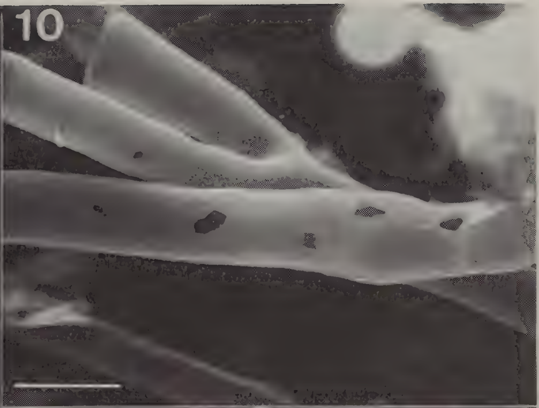
Material of *Calvatia complutensis* studied: SPAIN: Prov. Madrid, Alcalá de Henares, Campus Universidad de Alcalá, junto a un seto de *Thuja sp.*, terreno básico, *leg.* J. Sánchez, 24.XII.1986, AH 13238 HOLOTIPO; *ibidem*, junto a un seto de *Cupressus arizonica* E. L. Greene, terreno básico, *leg.* R. Galán; 8.XI.1994, AH 16884; km 8 ctra. Alcalá de Henares-Anchuelo, en cuneta con vegatación nitrófila, terreno básico, *leg.* A. Altés & G. Moreno, 12.XII.1991, AH 14273; Pinto, en jardín bajo *Robinia pseudoacacia* L. and *Sophora japonica* L., *leg.* R Morales, 9.V.1988, MA-Fungi 32093; *ibidem*, VI-1990, MA-Fungi 32092.

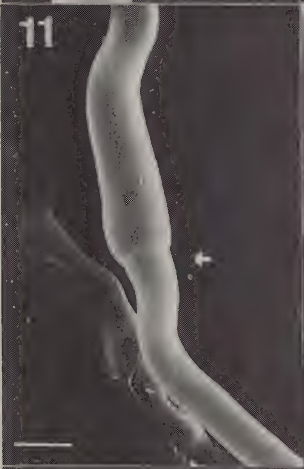
Material of *Calvatia pachyderma* studied: SPAIN: Prov. Gerona, Blanes, Cala Bona, *leg.* M. D. Sierra, MA-Fungi 19748. Prov. Barcelona, Bezos, *leg.* M. D. Sierra, MA-Fungi 31138. FRANCE: Dép. Pyrénées-Orientales, Corcega, Le Boulou, Plantation d'amandiers, *leg.* G. Hubin, 8.X.1986, MA-Fungi 19745;

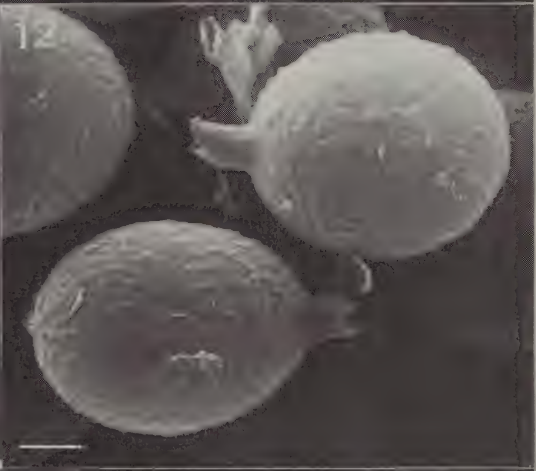
FIGS. 9-13. *Calvatia complutensis* Moreno, Kreisel & Altés AH 13238 HOLOTYPE. 9-11. Capillitium showing some septa and pits. 12, 13. Basidiospores with slightly verruculose ornamentation.

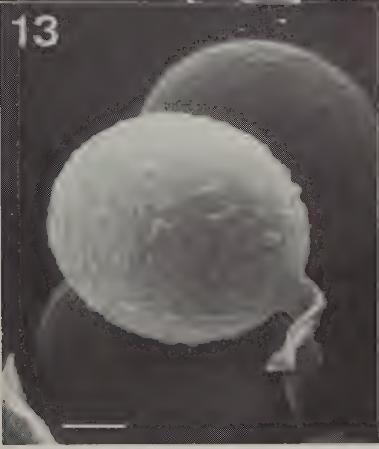
FIG. 14. Distinctly ornamented basidiospores of *Calvatia bicolor* (Lév.) Kreisel BCMEX 2102.
Scale bars: 9-11 = 5 µm; 12-14 = 1µm.

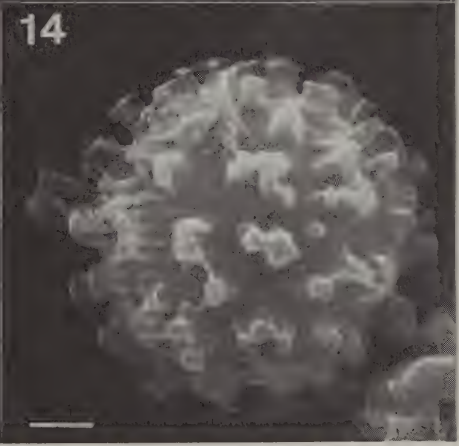

9


10


11


12


13


14

ibidem, Port-Vendres, près, 40 m, bord de friche sur schistes métamorphiques, *leg.* J. Lambinon, 4.VII.1985, MA-Fungi 19744. MEXICO: Baja California, Hacienda Santa Verónica, 130 km al NE de Ensenada, en *Eriogonum fasciculatum*, *leg.* S. Monroe, 5.IV.1986, BCMEX 3946 *in* AH; Isla Guadalupe, sin datos ecológicos, *leg.* H. Chávez, VIII.1978, BCMEX 1927 *in* AH.

Material of *Calvatia bicolor* studied: MEXICO: Baja California, 1 km al Sureste de San José del Cabo, en matorral con *Lycium sp.* y *Solanum sp.*, 9.XI.1984, *leg.* C. Ochoa & N. Ayala, BCMEX 2102; and see KREISEL (1994).

Material of *Lanopila capensis* studied: SOUTH AFRICA: Stellenbosch, coll. Miss A. V. Duthie, cat. 7567, TYPE in BPI 706162.

Observations: *Calvatia complutensis* is characterized by its dirty white and thin exoperidium, fulvous to bronze brown endoperidium, absence of subgleba, basidiospores under LM glabrous, under SEM finely rugose to verruculose, and capillitium with medium-sized pits. In size and colour pattern, it is remarkably similar to collections of *C. bicolor* (Lév.) Kreisel = [*Lanopila bicolor* (Lév.) Pat.] from Baja California (Mexico) and other places, including the holotype from Bombay, India (PC). Macroscopically, both species are difficult to differentiate, but *C. bicolor* has no pits in its capillitium hyphae, and its basidiospores are distinctly verrucose under LM and, particularly, under SEM (fig. 14).

The proposed species belongs to *Calvatia* sect. *Gastropila* (Homrich & J. E. Wright) Kreisel (KREISEL 1992, 1994), together with *Calvatia pachyderma* (Peck) Morgan, which is conspecific with *Gastropila fragilis* (Lév.) Homrich & J. E. Wright (DEMOULIN 1993), whose arguments we accept after examination of Peck's herbarium material. Therefore *C. pilula* Kreisel (KREISEL 1992) is considered to be a synonym of *C. pachyderma* (Peck) Morgan. Some years ago, DEMOULIN, MARTÍN & CALONGE (1988) recorded for the first time *C. pachyderma* from Europe; see also KREISEL (1989, p. 294). Later CALONGE & MARTÍN (1990) interpreted the type of *C. pachyderma* as a species with ornamented spores which was followed by KREISEL (1992, 1994). Previously, LLOYD (1923), COKER & COUCH (1928), and ZELLER & SMITH (1964) described *C. pachyderma* as a species with normally glabrous but sometimes ornamented spores. The causes of such uncertainty were recently clarified by DEMOULIN (1993).

The differences between *Calvatia complutensis* and *C. pachyderma* are summarized in the following table:

	Calvatia pachyderma (Peck) Morgan *sensu* Demoulin 1993, non Swoboda 1940, non Kreisel 1992	*Calvatia complutensis sp. nov.*
Basidiocarps diam.	77-170 mm (up to 250 mm, in Demoulin *et al.*, 1987)	23-70 mm
Base	wedge-shaped (cuneate), frequently deeply plicate	rounded (globose or pyriform), scarcely plicate
Endoperidium	1-4 mm thick	0.5-1.5 mm thick
Capillitium	with frequent very small pits	with less frequent medium-size pits
Colour of mature gleba	yellowish brown to umber brown, without olivaceous tints	dark olivaceous brown
Basidiospores	glabrous under LM and SEM	glabrous under LM, rugose to slightly verruculose under SEM
Distribution	Western United States, Mexico, South America, Mediterranean Europe (Spain and Southern France), Australia	Central Spain

Lanopila capensis C. G. LLoyd, described from temperate South Africa (LLOYD 1923) has a well-marked, compact subgleba, capillitium with abundant striking slit-like pits, and verrucose spores under LM and SEM.

Lanopila radloffiana Verwoerd, which is known only one collection from the Orange Free State, subtropical South Africa (BOTTOMLEY 1948), is said to have no subgleba, glabrous spores (under LM) and capillitium without pits. We have, so far, not succeeded in obtaining this material on loan. Although there are some differences between *Calvatia complutensis* and Bottomley's description of *L. radloffiana,* it would be interesting to compare the type material of both species at some future date.

ACKNOWLEDGMENTS

We express our gratitude to the conservators of the herbaria MA-Fungi, BCMEX, BPI, and PC for loan of material of *Calvatia complutensis*, *C. bicolor*, and the type collections of *Lanopila capensis* and *Bovista bicolor*. We are similarly thankful to Dr. A. Ortega, Granada, for the review of the manuscript, to Dr. F. D. Calonge, Madrid, for his comments, and to Mr. J. T. Palmer for checking the English text. We also thank Messrs. J.A.Pérez for their invaluable cooperation with the SEM. This work has been partly financed by DGICYT PB 91-0165.

REFERENCES

BOTTOMLEY, A. M. (1948). *Gasteromycetes* of South Africa. *Bothalia* 4:473-810.

CALONGE, F. D. (1990). Check-list of the Spanish *Gasteromycetes* (*Fungi, Basidiomycotina*). *Crypt. Bot.* 2:35-55.

CALONGE, F. D. & M. P. MARTIN (1990). Notes on the taxonomical delimitation in the genera *Calvatia, Gastropila* and *Langermannia* (*Gasteromycetes*). *Bol. Soc. Micol. Madrid* 14:181-190.

COKER W. C. & J. N. COUCH (1928). *Gasteromycetes of the Eastern United States and Canada*. Univ. of North Carolina Press, Chapel Hill. 201 pp.

DEMOULIN, V. (1993). *Calvatia pachyderma* (Peck) Morg. and *Gastropila fragilis* (Lév.) Homrich et Wright, two possible names for the same fungus. *Mycotaxon* 46: 77-84.

DEMOULIN, V., M. P. MARTÍN & F. D. CALONGE (1988). *Calvatia pachyderma* (Peck) Morgan (*Gasteromycetes*), nueva para Europa. *Bol. Soc. Micol. Madrid* 12: 85-88.

KREISEL, H. (1989). Studies in the *Calvatia* complex (*Basidiomycotina*). *Nova Hedwigia* 48:281-296.

KREISEL, H. (1992). An emendation and preliminary survey of the genus *Calvatia* (*Gasteromycetidae*). *Persoonia* 14:431-439.

KREISEL, H. (1994). Studies in the *Calvatia* complex (*Basidiomycetes*) 2. *Feddes Repert.* 105:369-376.

LLOYD, C. G. (1923). *Calvatia pachyderma* from Stewart S. Towne, California. *Mycological Notes* 7:1304, pl. 298.

LOCQUIN, M. V. (1975). *Natural color guide*. Publ. by the author. Sens, France. 12 pl.

MORENO, G., A. ALTÉS, C. OCHOA & J. E. WRIGHT (1995). Contribution to the study of the family *Tulostomataceae* in Baja California, Mexico. I. *Mycologia* 87:96-120.

ZELLER, S. M. & A. H. SMITH (1964). The genus *Calvatia* in North America. *Lloydia* 27:148-186.

MYCOTAXON

Volume LVII, pp. 163-170 January-March 1996

BADHAMIA MELANOSPORA Speg. A SPECIES WRONGLY INTERPRETED

CASTILLO A., C. ILLANA & G. MORENO

Dpto. Biología Vegetal. Universidad de Alcalá de Henares. 28871. Alcalá de Henares. Madrid. España.

Abstract: The type of *Badhamia melanospora* Speg. was studied, and a new description is given, including the study of spores by SEM. The Latin diagnosis is emended. It is compared to the type of *B. gracilis* (T. Macbr.)T. Macbr. The variety *B. gracilis* var. *melanospora* is proposed.

Keys words: *Badhamia melanospora*, *B. gracilis*, *Myxomycetes*, taxonomy, chorology.

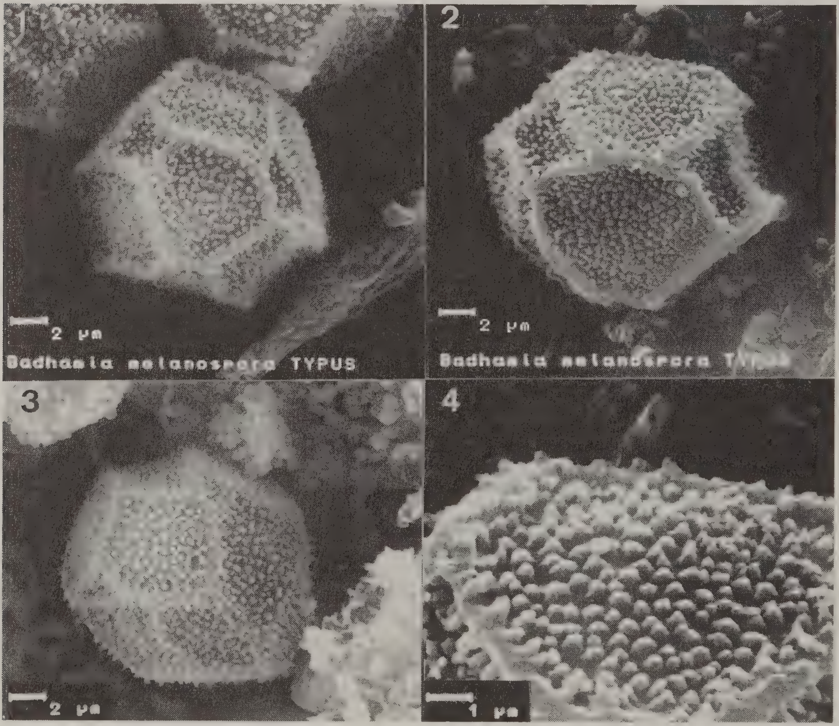
METHODS

Microphotographs of spores prepared by the critical point method, were made under a Zeiss-DSM 950 SEM. Our microscopical examinations were made on material mounted in Hoyer's medium or KOH (2%). We have used the terminology proposed by RAMMELOO (1974) for the descriptions of the spore ornamentation in our studies under the scanning electron microscopy (S.E.M.)

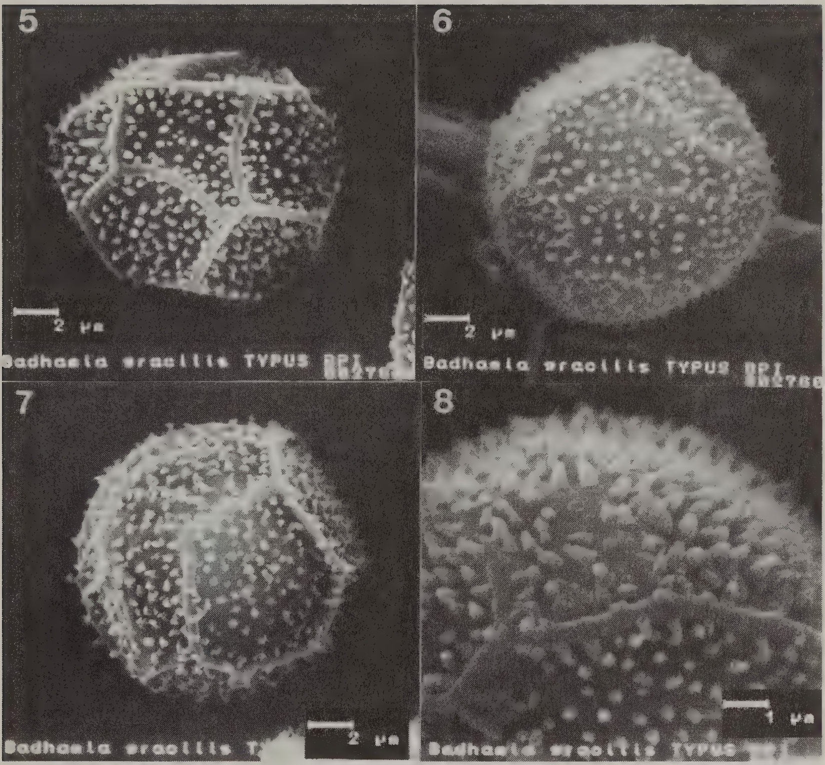
Badhamia melanospora Speg. Anales Soc. Ci. Argent. 10: 148. 1880. (Figs. 1-4).

Latin diagnosis: *Sporangia sessilia dense gregario-constipata, sphaeroidea, levia, cinereo, albida, sporis expulsis nivea. Columella nulla. Tubuli capillitii rigidiusculi crebre reticulatin conjucti, medio incrasato fusiformibus,* *nodulis planis; sporae conglobatae vel liberae, leves atrae, opacae, e mutua pressione polygono-angulosae,* 15 µm diam. *Hab. in trunco putrescente Cerei peruviani* in the Bagnado of San José de Flores, Argentina, may 1880.

Description: The type material of *Badhamia melanospora* Speg., which is in poor condition and consists of some basal remains of sporocysts on the remants of a *Cactaceae* "*Cereus peruvianus*". Sporocysts sessile, whitish, 0,5-0,8 mm. in diam. aprox., these measurements are difficult to determine exactly due to the poor condition of the specimen. Peridium single, thin and delicate, only preserved at the base. Hypothallus scanty, straw- coloured. Capillitium almost completely disrupted, but the scanty remains are badhamioid and nearly white. Spores appear scattered throughout the sample.



Plates 1-4: *Badhamia melanospora* Speg. LPS 31.437 (*typus*).-**1-3**: spores under the S.E.M. **4**: detail of spore ornamentation.


5
2 µm
Badhamia gracilis TYPUS BPI
6
2 µm
Badhamia gracilis TYPUS BPI
7
2 µm
Badhamia gracilis T
8
1 µm
Badhamia gracilis TYPUS

Plates 5-8: *Badhamia gracilis* BPI 802760 (choisen as *lectotypus*).- **5-7**: spores under the S.E.M. 8: detail of spore ornamentation.

Spores free, dark purple, 15-17 µm in diam., polygonal (angular in optical section), with dense warts uniformly placed. SEM shows the spores to be polygonal with well defined situated ridges, and the warts are uniformly positioned.

The type specimen was within a paper envelope, on which there are drawings of a globose, sessile sporocyst, capillitium that looks badhamioid and three spores which are clearly drawn as angular (possibly by Spegazzini).

Remarks: *Badhamia melanospora* has been treated in various way by different authors in their publications.

MASSEE (1892) described *Badhamia melanospora* as sessile, with spherical sporocysts and with spores either in clusters or free, smooth, black and subangular from mutual pressure, 15 µm in diam, the description seems to be a translation from the latin diagnosis.

LISTER (1925) stated: "possibly *Badhamia melanospora* Speg. with sessile sporangia and black spores clustered or free measuring 15 µm, is a form of *B. capsulifera* (Bull.) Berk., but in the absence of the type this must remain uncertain". MARTIN & ALEXOPOULOS (1969) agree with Lister. We believe that these authors had not seen the type material, and their description is literally based on the original diagnosis by Spegazzini, who pointed out that the spores are in clusters or free (*sporae conglobatae vel liberae*); according to our observations the spores are always free. The difference between *B. capsulifera* and *B. melanospora is* very evident, because the former has not got angular spores, besides forming clusters of 6-20 spores.

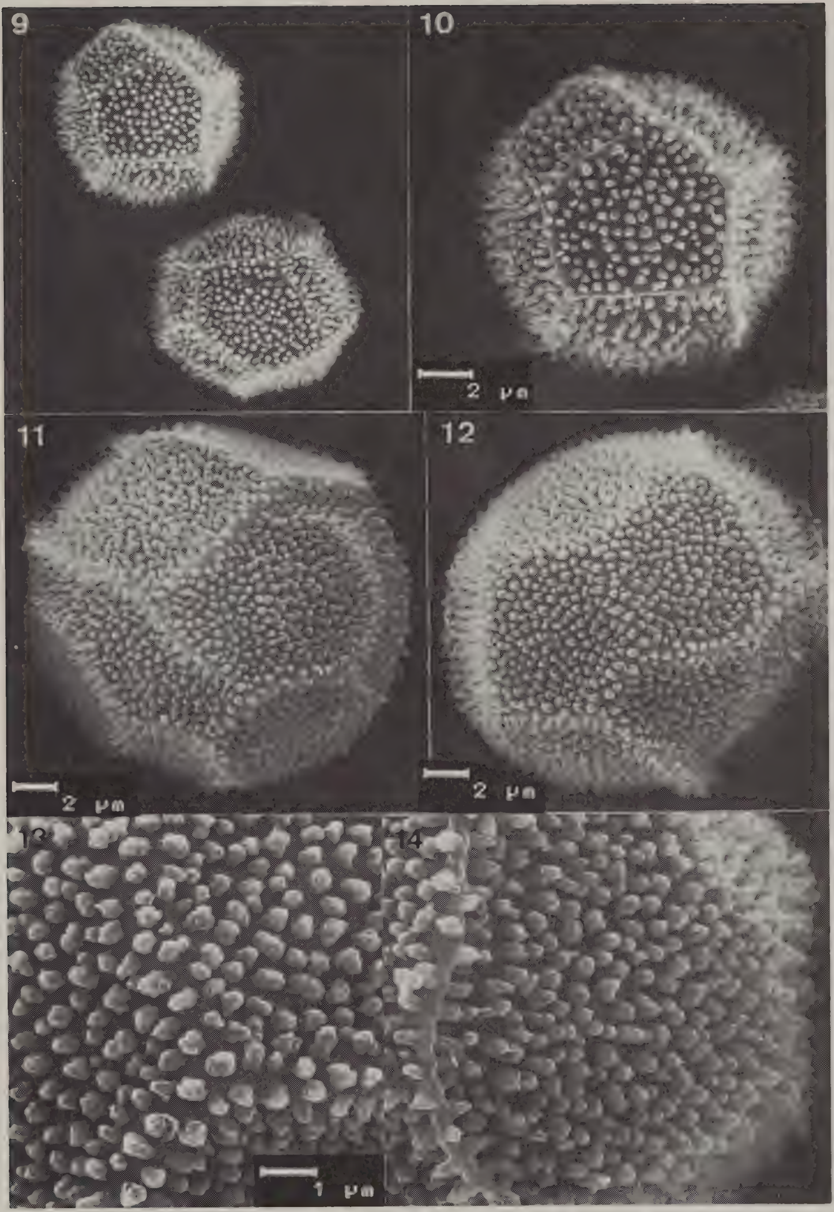
FARR (1976), who revised the type, stated that *Badhamia melanospora* Speg. is a synonym of *B. macrocarpa* (Cesati) Rostafinski, because she had not found noticeable differences between them. Farr states "the spores are angular when dry, but globose or nearly so when fully distended, 16-18 µm in diam.". We do not agree with the description of the spore morphology as given by Farr, since, in our slides in KOH 2%, they always show a polygonal outline with well defined ridges, which are specially pronounced under SEM. In our opinion *B. melanospora* and *B. macrocarpa* cannot be synonyms because, in all the descriptions of *B. macrocarpa*, no reference is made to the spore ornamentation being like *B. melanospora*.

NANNENGA-BREMEKAMP (1991) reports *Badhamia melanospora* for the Netherland, but her description, with regard to the spore ornamentation, does not agree with either the description given by Farr nor with ours. Moreover, she stated that the type material came from Madagascar.

Curiously, *Badhamia melanospora* has never been compared with the species that we think is very like it, viz: *B. gracilis* (T.Macbr.) T.Macbr.

On the spore ornamentation of *Badhamia gracilis*, many authors have given their opinions, from Macbride, when he gave the first description (in MACBRIDE & MARTIN, 1934), to HAGELSTEIN (1938, 1944). SCHEETZ & ALEXOPOULOS (1971) were the first to determine the structure of its spore ornamentation with S.E.M.

Comparing the spores of *Badhamia melanospora* with those of *B. gracilis*, we have observed that they are similar. By transmitted light, the


9
10
2 µm
11
2 µm
12
2 µm
13
1 µm
14

Plates 9-14: *Badhamia gracilis* AH 12051. 9-10: spores under the S.E.M.; *Badhamia gracilis* var. *melanospora* AH 16641.-**11-12**: spores under the S.E.M. 13-14: detail of spore ornamentation.

spores appear with spines uniformly placed, angular in optical section. Under SEM the ornamentation is verrucose (RAMMELOO, 1974) and the polygonal appearance shows very strong ridges (Figs. 1-8). The main difference between these species is the spore size, 15-18 µm in *B. melanospora* and 12-15 µm in *B. gracilis.* The spores of *B. melanospora* are generally darker than the spores of *B. gracilis* and the spore ornamentation of *B. melanospora* is formed by denser warts. On the other hand, the habitat where the types have been collected, is similar: *Cereus peruvianus* (*B. melanospora*) and *Yucca sp.* (*B. gracilis*). The Spanish material of *B. gracilis* frequently appears on *Opuntia ficus-indica* (LOPEZ-SANCHEZ & al., 1986).

The latin diagnosis of *Badhamia melanospora* by Spegazzini is wrong as regards the description of its spores, in the following points: the spores are free not forming clusters and polygonals, the diameter is larger than 15 µm and the ornamentation is verrucose. Due to preceding arguments, we propose that *B. melanospora* should be considered as *emend. nom.*

Badhamia melanospora is a taxon which has been quoted only a few times in the literature. These records were nevertheless wrong, being confused with other species of *Badhamia.* The differences in the spore size between *B. melanospora* and *B. gracilis* are evident; the former taxon should therefore be considered as a variety with larger spores (16-18 µm) of *B. gracilis.*

In Spain, we have studied collections of *Badhamia gracilis* with large spores, viz. 16-18 µm in diam. (figs. 11-14), similar to the sample from Argentina collected by Spegazzini, so we confirm the presence of *B. gracilis* var. *melanospora* in Europe. On the other hand, the typus material of *B. melanospora* is incomplete and badly preserved, therefore we propose as epitype (Art. 9.7 *Tokyo Code*) the sample AH 16641, Spain, Playa de los Genoveses, Cabo de Gata, Almeria, on cladodes of *Opuntia ficus-indica* (L) P. Mill., 24-II-94, *leg.*: E. Gallego, A. Altés, C. Illana & G: Moreno.

The taxonomic treatment we propose is the following:

Badhamia gracilis* var. *melanospora* (Speg.) Castillo, Moreno & Illana, *emend. nom., comb. et status nov.

≡ *B. melanospora* Speg. Anales Soc. Ci. Argent. 10: 148. 1880

Badhamia grandispora Illana & Moreno, is close to *B. gracilis* var. *melanospora* by its spore size, but can be distinguished by the pale pinkish flesh colour of the sporocysts and by the spore ornamentation (ILLANA & al., 1992).

Material studied: *Badhamia melanospora* (*typus*): ARGENTINA. Buenos Aires, in the Bagnado of San José de Flores, V-1880, *leg.* C. Spegazzini, on *Cereus peruvianus* (L) P. Mill., in LPS 31.437.
Badhamia gracilis: USA. Leyden, Southern Colorado, 25-VI-1910, *leg.* E. Bethel, on *Yucca sp.,* in BPI 802760 (choisen as *lectotypus*), 802761, 802762 & 802763. SPAIN. Barbaón stream, Natural Park of Monfragüe, Cáceres, on *Opuntia ficus-indica* (L) P. Mill., *leg.* C. Illana & G. Moreno, AH 12051. Val de Uxo, Castellón, on *Opuntia ficus-indica* (L) P. Mill., 19-IV-92, *leg.* A. Castillo, AH 14564. Azuaga, Badajoz, on cladodes of *Opuntia ficus-indica* (L) P. Mill., 27-XI-91, *leg.* J. R. García, AH 14250. *Ibidem*, 2-I-92, 3-I-92, 10-X-92, AH 16350, 16152 and 16180. *Badhamia gracilis* var. *melanospora*: SPAIN. Playa de los Genoveses, Cabo de Gata, Almeria, on cladodes of *Opuntia ficus-indica* (L) P. Mill., 24-II-94, *leg.*: E. Gallego, A. Altés, C. Illana & G: Moreno, AH 16440, 16641 (epi*typus*) and 16644. Los Retacos, road from Tabernas to Turrillas, Almería, on cladodes of *Opuntia ficus-indica* (L) P. Mill, 25-II-94, *leg.*: A. Altés, G. Moreno & C. Illana, AH 16638.

ACKNOWLEDGEMENTS

We wish to express our gratitude to the DGICYT for granting us Research Project PB 91-0165, which is included this work, and the Univ. of Alcalá de Henares for financing the Research Project ref. 93/10; to the "Consejo Social" of the Univ. of Alcalá de Henares for financial supports which enabled us to visit the National Botanic Garden of Meise, Belgium. We thank J. A. Pérez from the "Servicio de Microscopía Electrónica" of the Univ. of Alcalá de Henares, for their help with the S. E. M.; and the curator of herbaria AH, LPS and BPI for lending the material in their herbarium. The authors are also grateful to Mrs. Nannenga-Bremekamp and Dr. Rammeloo for their revision and scientific comments, to Mr. J. T. Palmer for kindly checking the English.

LITERATURE

FARR, M. L. (1976).- *Flora Neotropica. Monograph n°16. Myxomycetes.* The New York Botanical Garden. New York.304 pp.

HAGELSTEIN, R. (1938).- Notes on Mycetozoa II. *Mycologia* 30: 336-353.

HAGELSTEIN, R. (1944).- *The Mycetozoa of North America.* Publ. by the author. Mineola. New York. 306 pp.

ILLANA, C, G. MORENO & M. HEYKOOP (1992).- Spanish Myxomycetes. V. A new species of *Badhamia* and a new variety of *Physarum*. *Mycotaxon* 45: 241-247.

LISTER, A. (1925, reprint 1972).- *A monograph of the Mycetozoa.* 3ª ed. revised by G. Lister. Johnson Reprint Corp. 296 pp.

LOPEZ-SANCHEZ, E., M. HONRUBIA, E. GRACIA & F. J. GEA (1986).-Estudio de los Mixomicetos que fructifican sobre Opuntia ficus-indica L. en el S.E. de España peninsular. *Anales Biol., Fac. Biol., Univ. Murcia* 10: 41-48.

MACBRIDE, T. H. & G. W. MARTIN (1934).-*The Myxomycetes.* New York. 1934.

MARTIN, G. W. & C. J. ALEXOPOULOS (1969).- *The Myxomycetes.* University of Iowa. Iowa. 561 pp.

MASSEE, G.(1892).- *A monograph of the Myxogastres.* Methuen & Co. London.367 pp.

NANNENGA-BREMEKAMP, N. E. (1991).- A guide to temperate Myxomycetes. Biopress Limited. Bristol. 409 pp.

RAMMELOO, J.(1974).- Structure of the epispore in the Trichiaceae (Trichiales, Myxomycetes), as seen with the Scanning Electron Microscope. *Bull. Soc. Roy. Bot. Belgique* 107: 353-359.

SCHEETZ, R. W. & C. J. ALEXOPOULOS. The spores of Badhamia gracilis (Myxomycetes). *Trans. Amer. Microscop. Soc.* 90: 473-475. 1971.

SPEGAZZINI, C. (1880).- Fungi Argentini. *Anales Soc. Ci. Argent.* 10: 145-167.

MYCOTAXON

Volume LVII, pp. 171-174 January-March 1996

A NEW *INOCYBE* (CORTINARICEAE) FROM KERALA STATE, INDIA

K B VRINDA, C K PRADEEP,
A VIJAYA JOSEPH AND T K ABRAHAM
Tropical Botanic Garden and Research Institute, Palode,
Thiruvananthapuram-695 562, Kerala, India.

ABSTRACT

Inocybe virosa is described as new based on collections from Kerala, South India

As part of an ongoing study of the agaric flora of Western Ghats of Kerala, an interesting species of *Inocybe* (Fr.) Fr., was collected, typical of the section *Rimosae* (Fr.) Quél., yet differing from all the species so far described in that section. The collection therefore represents a formerly undescribed species and is considered as a distinct taxon. Descriptions are based on fresh specimens collected by the authors. Specimens were studied both macro and microscopically immediately after collection. All sections were prepared in 3% KOH. Colour terminology used is that of Kornerup & Wanscher (1967). The specimens are deposited in the mycological herbarium of the Microbiology division, TBGRI, Kerala and part at Kew.

Inocybe virosa sp.nov. Fig. 1, A-D.

Etymology: L.*virosa,* full of poison

Pileus 2-8 cm latus, conico-convex expandens ad planum, late umbonatus, flave fuscus in disco, fasce luteus alibi, radiate appressus fibrillosus, remosus ad marginem. Lamellae adnexae, densae, flave canae, cum lamellulis variarum longitudinum. Stipes 4-10 cm x 2-11 mm, centralis, cylindricus, aequalis, fistulosus, flave albus, longitudine fibrillosus striate. Sporae 6.5-7.5 × 4.5-5.5 µm, ellipsoideae. Basidia clavata, tetrasporigera. Cheilocystidia clavata vel vesiculata, hyalina. Pleurocystidia nulla.

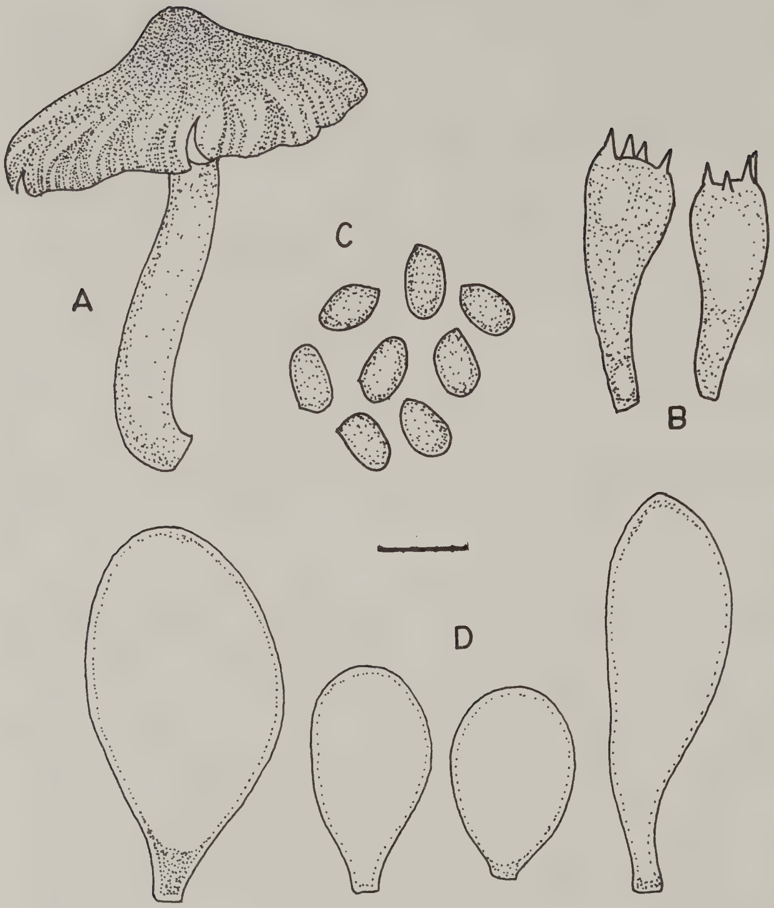


Fig. 1 *Inocybe virosa*. A. habit x 1 : B. basidia; C.spores;D.cheilocystidia
Scale bar = 10 µm

Pileus 2-8 cm diam., conico-convex, soon expanding to plane, broadly umbonate; surface uniformly 'cognac' (6E7) in bud, otherwise 'cognac' to 'yellowish brown' (5E8-6E7) at the central umbonate region and 'topaz' (5C5) elsewhere, radially appressed fibrillose, rimose towards the margin. Lamellae adnexed,'putty'(4B2)becoming brownish with age , 2-4 mm broad crowded with lamellulae. Stipe 4-10 cm x 4-11 mm, central, cylindric, equal, fistulose; surface 'yellowish white' (4A2), longitudinally fibrillose striate. Annulus none. Context dull white to pale buff, up to 4mm wide at the centre, without any apparant colour change when cut or bruised, composed of hyaline, thin-walled, inflated hyphae,3-24 um diam., with clamp-connexions. Spores 6.5 -7.5 x 4.5-5 μm, ellipsoid, with a smooth, yellowish brown slightly thickened wall. Basidia 24-30 x 7.5-10.5μm, clavate, bearing four sterigmata. Lamella-edge sterile, with crowded cheilocystidia.Cheilocystidia 19.5- 40.5 x 13.5- 21 μm, clavate or clavato-cylindric, thin-walled, hyaline sometimes pale brown in older specimens. Pleurocystidia absent. Hymenophoral trama regular, hyaline, of thin-walled hyphae, 2-10 μm diam., inflated up to 30 μm. Subhymenial layer pseudoparenchymatous. Pileipellis a cutis of radially parallel, repent, thin-walled hyphae, often encrusted with a brown pigment. Caulocystidia absent.

Terrestrial, solitary or in groups, probably mycorrhizal in association with *Aporosa cuminata* Thw. (Euphorbiaceae) and *Knema attenuata* (Wall.ex Hook. f. & Thoms) Warb. (Myristicaceae).

Materials examined: India,Kerala: TBGRI campus , 16 Oct. 1993, No.18; 19 Oct. 1993, No. 34; 21 Oct. 1993, No. 74; 24 Nov. 1993, No. 431; 26 Nov 1993, No.441 (holotype); 22 April 1994, No.642; Silent Valley National Park, 18 May 1994, No.718; TBGRI campus, 25 May 1994, No. 753; Kallar forests, 17 June 1994, No 884; TBGRI campus, 14 June 1994, No.911; 18 July 1994, No. 1098; Agasthyamala, 26 July 1994, No. 1258; TBGRI campus,28 July 1994, No.1994.

The rimose pileal surface, smooth spores and absence of metuloidal cystidia places this species in sect. *Rimosae* (Fr.) Quél., and it is closely allied to the widespread species, *I. fastigiata* (Schaeff.:Fr.) Quél., but differing in the colour of the basidioma and the spore size. It seems to be close to *I.cutifracta* Petch, described from Peradeniya, Sri Lanka (Petch,1917), but differs in the habit, size of spores and shape of the cheilocystidia. *Inocybe cutifracta* is reported to be a good edible species

(Singer, 1975) but our species is found to be highly toxic (a rapid,uncomplicated dose- response assay was conducted on albino rats). Another distinctive poisonous member of this group, *I.fastigiata,* has larger spores, differently coloured basidioma and has a small but conspicuous bulb at the base of the stipe.

We have been unable to find a record of species of *Inocybe* with the particular combination of our species.Therefore this is considered as a distinct taxon.

ACKNOWLEDGEMENTS

The authors are grateful to the WGDP of the Department of Planning and Economic Affairs, Government of Kerala for the financial assistance and to Dr. P.Pushpangadan, Director, TBGRI, for the encouragement and facilities for carrying out this work.

Help rendered by Dr.D N Pegler, Royal Botanic Gardens, Kew, England in confirming the identity of the species, for helpful comments on the manuscript and presubmission review of the text is gratefully acknowledged. Thanks are also due to Dr. K J Joseph, Institute of European languages, Trichur, Kerala for the Latin diagnosis.

REFERENCES

Kornerup, A & Wanscher, J.H. 1967. *Methuen Hand book of colour* London Methuen &Co. 243pp

Petch, T. 1917. Additions to Ceylon Fungi. *Ann. Roy. Bot. Gard., Peradeniya* 6:201.

Singer, R. 1975. *Agaricales in Modern Taxonomy.* Edit. 3. Vaduz: J. Cramer. 912 pp

MYCOTAXON

Volume LVII, pp. 175-186 January-March 1996

LACTARIUS MEDITERRANEENSIS, A NEW SPECIES FROM THE MEDITERRANEAN REGION.

J. LLISTOSELLA

Dep. Biologia Vegetal (Botànica), Univ. Barcelona, Av. Diagonal 645, E-08028 Barcelona. España.

F. BELLÚ

Via Cesare Battisti,34; I-39100 Bolzano. Italia.

ABSTRACT: ***Lactarius mediterraneensis,* a new species from the Mediterranean region.** *Lactarius mediterraneensis* (Subg. *Piperites*, Sect. *Piperites*, Subsect. *Croceini*) sp. nov. and its forma *citrina* are described from *Quercus* woodlands in the Mediterranean region. Their systematics are discussed.

Key words: *Lactarius, Russulaceae,* taxonomy.

RESUMEN: ***Lactarius mediterraneensis,* una nueva especie de la región mediterránea**. Se describe *Lactarius mediterraneensis* (Subg. *Piperites*, Secc. *Piperites*, Subsecc. *Croceini*), especie nueva procedente de los bosques de encinas y robles de la región mediterránea; se comenta su posición sistemática y se compara con las especies próximas. Se describe también *Lactarius mediterraneensis* forma *citrina*.

SOMMARIO: ***Lactarius mediterraneensis,* una nuova specie della regione mediterranea**. Viene descritto *Lactarius mediterraneensis* (Subg. *Piperites*, Sez. *Piperites*, Subsez. *Croceini*), specie nuova ritrovata nei boschi di querce della regione mediterranea; si discute la sua posizione sistematica e si compara con le specie vicine. Viene descritto anche *Lactarius mediterraneensis* forma *citrina*.

Lactarius mediterraneensis Llistosella et Bellú sp. nov.

Pileo 4.2-13.5 cm, convexo, vix umbilicato, dein lato, in medio valde depresso, tandem infundibuliformi; unctuoso, ad extremam partem vix zonato, sed plerumque confertim scrobiculato, cum scrobiculis concentricis et obscurioribus quam in reliqua superficie, interdum minoribus et valde confertis, interdum maioribus et minus confertis; margine involuto, dein expanso, laevigato vel vix tomentoso; colore a cremeo-roseo usque ad ochraceo-luteolo, plerumque clariore ad marginem et obscuriore ad mediam partem.

Stipite 2.5-5 x 1.3-3.2 cm, cylindrico, brevi, solido, medulloso, aetate cavo; leviter tomentoso, dein laevigato, plerumque non scrobiculato vel cum rarissimis scrobiculis, colore cremeo vel cremeo-albido, postremo usque ad ochraceo.

Lamellis 3-9 mm latis, modice remotis, ad marginem 7-10 in cm; ad adnatis usque ad leviter decurrentibus, lamellulis praeditis et valde furcatis; colore a cremeo usque ad cremeo-ochraceum, denique obscure ochraceo, saepe cum rubigineis maculis. Sporata ochracea.

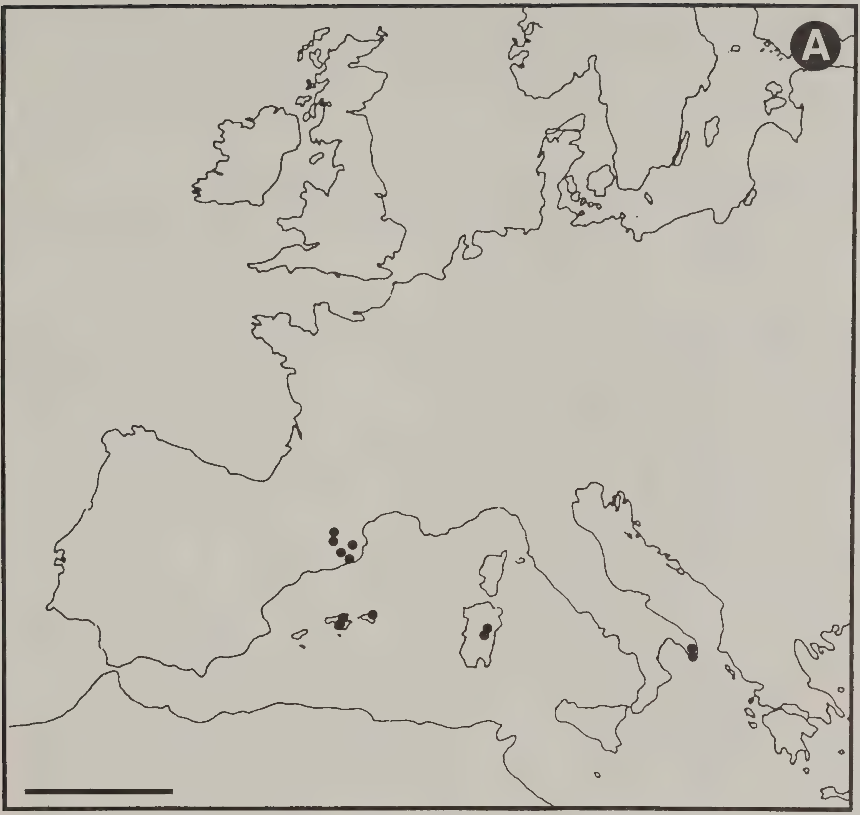
Carne dura, firma, alba, fracta 1-2 fere minutis ad luteum paulatim vergente, postremo carneo-luteola; KOH ope statim colore xantho in carne et in lactice segregato paulatim cremeo vel luteo-cremeo. Odore laevi, pomaceo. Sapore forti, piperato. Lactice parum abundanti, acri, colore albo, statim ad luteum vergente.

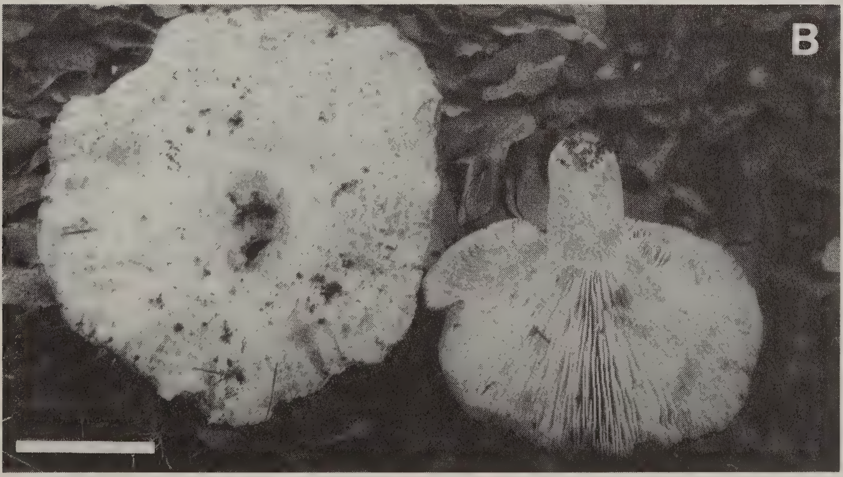
Sporis (9)-10-12-(13.5) x (7.5)-8-10-(11) µm, subglobosis, amyloideis reticulatis, cum reticulo paene integro. Basidiis 43-78 x 13-20 µm, claviformibus, tetrasporis. Cystidiis 43-74 x 3-7 µm, vel cylindraceis vel lageniformibus, valde polymorphis, flexuosis, diverticulatis vel catenuliformibus, valde numerosis. Cute pilei trama composita cum pilis cylindraceis, 3-6 µm latis, apice subcapitatis; pigmento luteolo plerumque extracellulare; dermatocystidiis numerosis, 4-8 µm latis, usque ad 120 µm longis, cylindraceis vel vix capitatis

Habitatio in quercetis termophilis, plerumque sempervirentibus, in Mediterraneis regionibus (Catalaunia, Baleares, Italia), in solo calcareo. Holotypus in loco dicto Can Pep Torrandell, prope Pollença, in insula Majorica (Baleares), sub querco ilici, a J.L. Siquier et J. Llistosella lectus, 9/XI/1992; in

---

Fig. 1 - *Lactarius mediterraneensis*. **A**) Known geographic range in the European Mediterranean region (scale bar = 500 Km). **B**) Macroscopic appearance (ex holotype) (scale bar = 5 cm).


A


B

Herbario Facultatis Biologiae Universitatis Barcinonensis (BCC JL1484) servatus.

Mycologiae Mediterraneensis Europaeae Confederationi (CEMM) dicatus.

Lactarius mediterraneensis Llistosella et Bellú sp. nov.

Etym.: in honour of the *Confederatio Europaea Mycologiae Mediterraneensis* (CEMM).

Pileus: 4.2-13.5 cm diam., convex and slightly umbilicate, later expanded, plano-convex, the umbilicus somewhat abrupt and obtuse, finally infundibuliform; margin entire, first revolute but expanding gradually. Cuticle slightly unctuous or subviscid, often dry and laccate or silky towards the margin, thin and elastic, easily separable to 1-1.5 cm from margin; sometimes vaguely zonate towards the centre, characteristically covered from the margin with crowded, more or less concentric scrobiculae; margin in very young specimens finely tomentose, sometimes exuding watery droplets, quickly becoming glabrous. Colour: pinkish cream or ochraceous yellow to orange-ochre; margin paler, in young specimens whitish cream and contrasting with orange-ochre scrobiculae and centre.

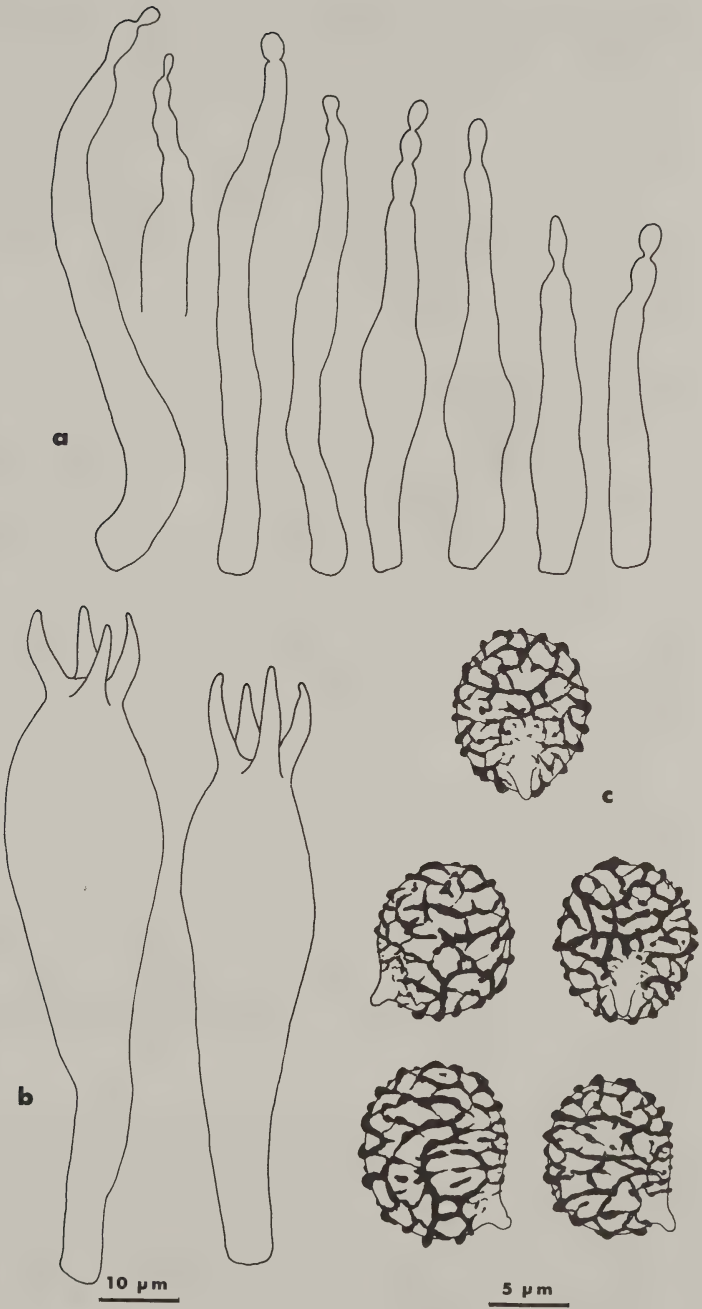
Stipe: 2.5-5 x 1.3-3.2 cm, cylindrical, short and robust, base sometimes anfractuose; centre first solid, but gradually becoming hollow. Surface at first finely tomentose, later glabrous and smooth from the base, laccate or silky, typically not scrobiculate, although some specimens may produce a few small watery exudation droplets, with scattered scrobiculae appearing later. Colour: whitish cream, almost white at the apex, darkening with age to slightly dirty ochre, often staining reddish brown.

Gills: 3-9 mm wide, thin, somewhat spaced, 7-10 per cm at margin, adnate to subdecurrent, with numerous lamellulae; interveined and often bifurcate. Colour: first ochraceous-cream or apricot, finally dirty ochre, staining orange-ochre or reddish brown where bruised. Spore print ochraceous (A5-B4 in MOSER 1980).

Flesh: firm and compact, white when cut, turning somewhat citrine yellow in less than a minute, especially under the cuticle, under the stipe cortex and on the gills; progressively turning pinkish

---

Fig. 2 - *Lactarius mediterraneensis*. **a**) Cystidia. **b**) Basidia. (scale bar = 10 µm) **c**) Spores. (scale bar = 5 µm).


a
b
c
10 µm
5 µm

or dirty pinkish cream over the entire surface. Smell: slightly fruity-lactarioid; taste first bitter but soon very acrid.

Chemical reactions: flesh instantly turning chrome-yellow or orange-yellow in KOH, latex cream-coloured, slowly turning chrome-yellow upon drying. Deep blue in guayacol. Turning greyish-green after half an hour in $FeSO_4$.

Spores: (9-)10-12(-13.5) x (7.5-)8-10(-11) μm, subglobose, ornamentation amyloid, crests up to 1 μm tall, forming an almost complete reticulum, meshes dense and closed, only occasionally open and tending to form isolated warts. Suprahilar plage non-amyloid.

Basidia: 49-78 x 13-20 μm, voluminous, clavate, tetrasporic, sterigmata broad and up to 11 μm long.

Cystidia: 43-74 x 3-7(-9) μm, very abundant, cylindrical to narrowly lageniform, not exceeding the basidia, apex appendiculate or multistrangulate. SBA positive.

Cuticle: formed by a compact tissue with cylindrical hairs, x 3-6 μm, segments mostly swollen at septa and more or less tortuous, terminal ones long, apex often capitate, up to 6-8 μm wide, basal ones shorter and wider; extracellular pigment yellowish. Dermatocystidia frequent, very long and narrow, up to over 120 x 4-8 μm, cylindrical, apex obtuse or slightly capitate, 0-(1) septate; SBA positive. Laticiferous tubes abundant in the deeper layers.

Habitat: fruiting in autumn, solitary or gregarious, in *Quercus* woods, especially *Q. ilex*, exclusively on calcareous soils.

MATERIAL STUDIED

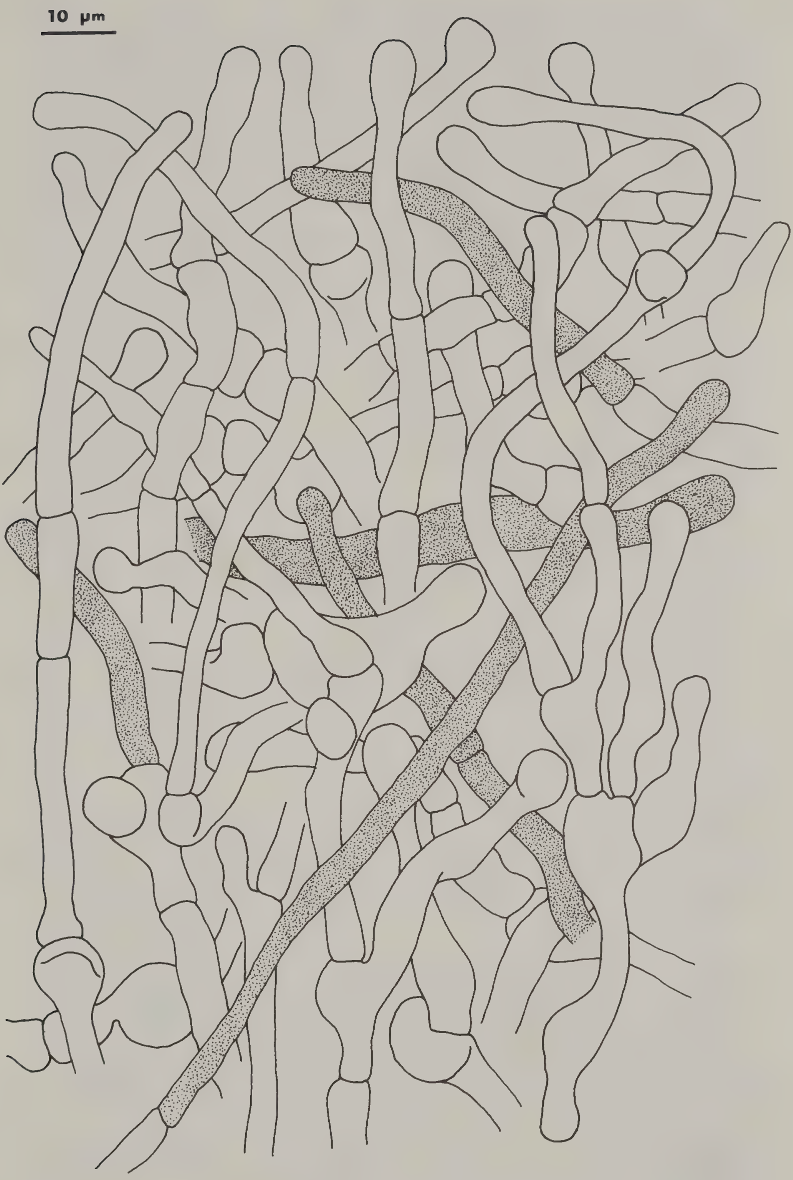
Kept at herbaria of the Facultat de Biologia, Universitat de Barcelona (BCC), Museo Civico di Storia Naturale di Venezia (MCVE) and Associazione Micologica Bresadola de Bolzano (AMBB).

SPAIN:

BALEARIC ISLES, MALLORCA: Pollença, Can Pep Torrandell. UTM 31SEE01. 40 m alt.; *Quercus ilex*; 9/XI/1992, leg. J.L. Siquier and J. Llistosella. Holotype, Herb. Fac. Biol. Univ. Barcelona (BCC JL1484). *Ibid.*, Isotype (BCC JL1485, JL1486, JL1487). Escorca, Son Massip. UTM 31SDE80. 450-550 m alt.,

---

Fig. 3 - *Lactarius mediterraneensis*. Cuticular elements: hairs and dermatocystidia (scale bar = 10 µm).


10 µm

Quercus ilex; 20/XI/1984, leg. J.L. Siquier (BCC JL445). Pollença, Vall de Ternelles. UTM 31SDE91. 150-200 m alt., *Quercus ilex*; 14/XI/1992, leg. E. Descals (BCC JL1485). Escorca, Predi d'Escorca. UTM 31SDE80. 650-750 m alt., *Quercus ilex*; 8/XI/1992, leg. M.A. López de Gregorio (BCC JL1486). MENORCA: Maó, Sta. Catalina de Dalt. UTM 31SFE02. 50-70 m alt., *Quercus ilex*, *Pinus halepensis*; 15/XI/1986, leg. J. Llistosella (BCC JL932). St. Lluis, Rincó d'Es Rafalet. UTM 31SFE11. 5-15 m alt., *Quercus ilex*; 15/XI/1990, leg. J. Llistosella (BCC JL1442). Alaior, Sta. Ponça. UTM 31SEE92. 110-130 m alt., *Quercus ilex*, *Pinus halepensis*; 16/XI/1990, leg. J. Llistosella (BCC JL1445).

CATALONIA, BARCELONA: Mura, Coll des Tenalles. UTM 31TDG11. 850-900 m alt. *Quercus ilex*; 12/X/1992, leg. A. Ramírez (BCC JL1488). *Ibid.* 5/X/1992, leg. A. Ramírez (BCC JL1489). Olesa de Montserrat, Torrent de Sta. Maria. UTM 31TDG00. 150 m alt. *Quercus ilex*; 4/X/1992, leg. J. Vila (BCC JL1492). GIRONA: La Vall d'en Bas, La Coma. UTM 31TDG57. 400 m alt. *Quercus ilex*, *Q. robur*, *Buxus sempervirens*; 14/XI/1987, leg. M. Aguasca (BCC JL1211 and JL1212). LLEIDA: Os de Balaguer, Bellpuig de les Avellanes. UTM 31TCG13. 500-550 m alt. *Quercus faginea*; 27/IX/1991, leg. J.M. Pérez (BCC JL1471). Vilanova de Meià, Barranc de les Torres. UTM 31TCG45. 850-900 m alt. *Quercus ilex*; 24/X/1992, leg. J. Llistosella (BCC JL1490).

ITALY:

PUGLIA, LECCE: Specchia, Bosco Antenna. IGM 536-1. 180 m alt., *Quercus ilex*, *Q. coccifera*; 17/XI/1991, leg. F. Bellú. Gagliano al Capo, Bosco di Gagliano. IGM 537-3. 150 m alt., *Quercus ilex*; 18/XI/1991, leg. F. Bellú. Montesano, Bosco Bitonti. IGM 537-4. 100 m alt., *Quercus ilex*, *Q. coccifera*; 21/XI/1991, leg. F. Bellú (AMBB 91-177).

SARDINIA, NUORO, Orgosolo, Sas Baddes. IGM 517-4. *Quercus ilex*; 9/XI/1994, leg. A. Gennari (MCVE 6678). Oliena, Lanaittu. IGM 500-2. *Quercus ilex*; 11/XI/1994, leg. A. Gennari and G. Robich (MCVE 6679).

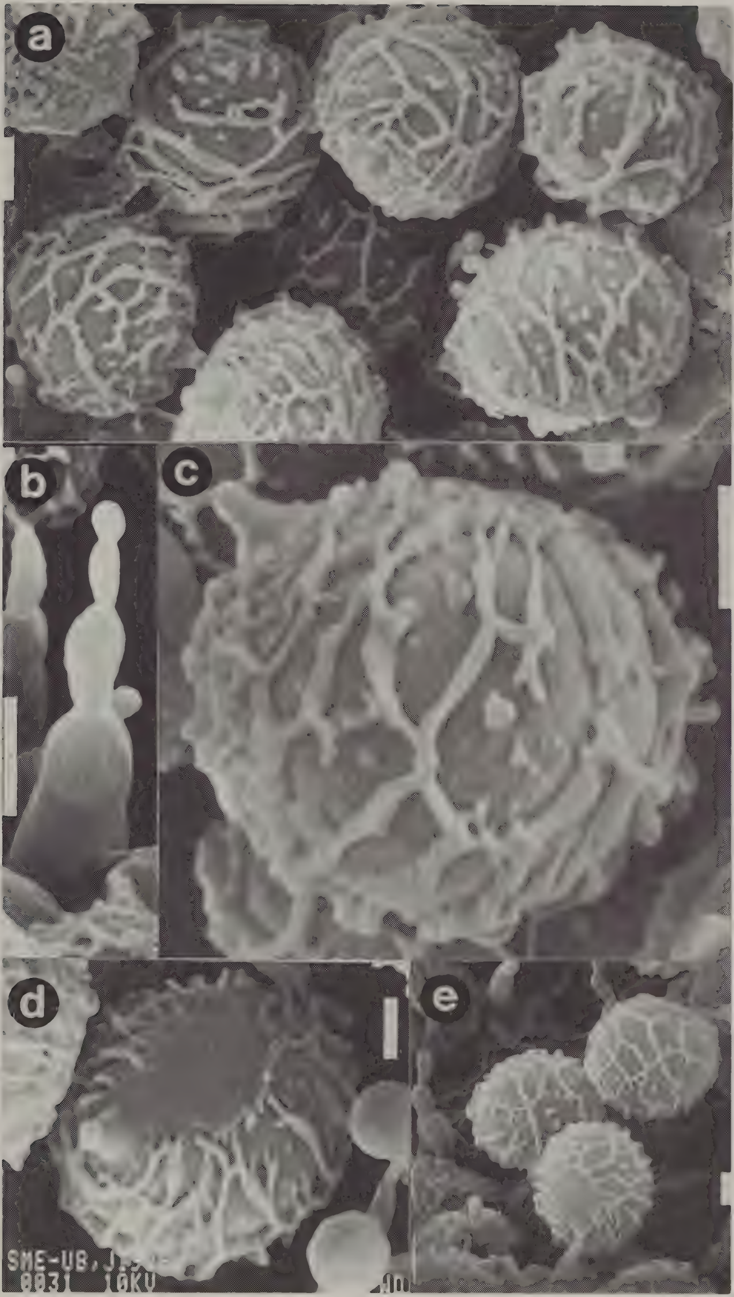
Lactarius mediterraneensis f. *citrina* Llistosella et Bellú f. nov.

A typo coloribus citrinis pileoque non scrobiculato differt.

Lactarius mediterraneensis f. *citrina* Llistosella et Bellú f. nov.

Differing from the type in the citrine colouration of pileus and stipe, in the absence of pileal scrobiculae and in the cuticle structure which separates easily to mid-radius of the pileus.

Fig. 4 - *Lactarius mediterraneensis* (SEM). **a**, **c**, **d** and **e**) Spores. **b**) Hymenial cystidia. (scale bar = 2 μm)


a
b
c
d
e
SME-UB,J
0031 10KV

MATERIAL STUDIED

SPAIN: BALEARIC ISLES; MALLORCA: Pollença, Can Pep Torrandell. UTM 31SEE01. 40 m alt.; *Quercus ilex*; 9/XI/1992, leg. J.L. Siquier and J. Llistosella. Holotype, Herb. Fac. Biol. Univ. Barcelona (BCC JL1491).

DISCUSSION

Since 1984, we have studied numerous collections of *Lactarius mediterraneensis* from Catalonia, the Balearic Isles (Spain) and, recently, also from Puglia and Sardinia (Italy).

In the field, the medium to large sized, basically ochraceous basidiomata of *L. mediterraneensis* may be confused with *L acerrimus* Britz. and *L. zonarius* Fr. (Subsect. *Piperites*). It is distinguishable from these by its more or less scrobiculate pileus surface (most evident near the margin) and its latex, which, although not abundant, stains distinctly citrine yellow within a minute.

The stipe of *L. mediterraneensis* is generally not scrobiculate, it turns characteristically dirty ochraceous or slightly greyish with age, but it always appears silky or laccate. However, the absence of scrobiculae is not a constant feature: in some specimens scattered scrobiculae were noted and one single specimen even showed a totally scrobiculate stipe.

The flesh is whitish when cut, locally changing within a few seconds to citrine yellow near the gills and under the stipe cortex. As in *L. zonarius*, it gradually acquires pinkish or dirty pink tints, whereas in older specimens the citrine colour of the flesh may be masked by a reddening process; in this case it appears dirty pink from the beginning when cut. These staining qualities, especially when little latex is exuded, led to confusions with *L. zonarius*.

One specimen from the type locality was not ochraceous in colour, it featured a non scrobiculate, citrine pileus, with some reddish brown spots, vaguely zonate towards the center (*f. citrina*). Due to the absence of scrobiculae the cuticle could easily be peeled off almost down to mid-radius. This may lead to confusion with *L. resimus* Fr., *L. citriolens* Pouz. and *L. scrobiculatus* Fr. (Subsect. *Scrobiculati*), although those are either very viscid and grow in non-Mediterranean habitats or have a bearded margin.

According to the literature, *L. intermedius* (Kromb.) Cooke - still a controversial taxon - may also resemble our species.

KYTÖVUORI (1984) does not include it in his revision of this Subsect. in NW-Europe and cites the original illustration by KROMBHOLZ (1843) under *L. scrobiculatus*. Furthermore NEUHOFF (1956) synonymizes *L. intermedius* with *L. cilicioides* (=*L. citriolens*). On the other hand, BON (1980) and MARCHAND (1980) place *L. intermedius* near *L. scrobiculatus* and distinguish it from the latter by its pileus, which is ochraceous cream, dry or subviscid, with a finally glabrous and guttulate-scrobiculate margin, and an entirely scrobiculate stipe. These characters initially made us doubt the identity of our species. However, the above mentioned authors also state that the spores of *L. intermedius* are verrucose or crested, and that they are 6.5-10 x 6-7.5 μm in size. Thus they are smaller and very different from those of *L. mediterraneensis*. Furthermore, KROMBHOLZ (1843) describes the pileus of *Agaricus intermedius* as viscous and ochraceous-yellow (*luteo-ochraceo*) and the stipe as yellowish and scrobiculate (*luteolo, scrobiculis maculaeformibus*). In addition, his illustration does not show any pileal scrobiculae, which are so particularly characteristic of our species.

Recently KONG & ESTRADA (1994) described *L. mexicanus* (Subsect. *Scrobiculati*) from Mexico, which they consider to be closely related to *L. scrobiculatus* and *L. intermedius*, and which also resemble our species in certain features. However, the colour of *L. mexicanus* is more yellowish, scrobiculae appear only on the stipe and the spore print is cream-coloured, whereas *L. mediterraneensis* is basically ochraceous with a scrobiculate pileus and an ochraceous spore print. Microscopic differences are even more apparent: spores are smaller (7.9-9.8 x 6.6-7.9 μm) and cystidia broader (8-13 (-17) μm) and longer, projecting the hymenium by up to 45 (-65) μm, in *L. mexicanus*.

Microscopically, *L. mediterraneensis* is characterized by its large spores (10-12 x 8-10 μm), only comparable to those of *L acerrimus* Britz. and *L. echinosporus* Z. Sch., although the former shows bisporous basidia and an unchanging latex and the latter has echinulate spores, as indicated by its name. In contrast, the spores of *L. mediterraneensis* are covered by a complete and dense reticulum and the basidia are always four-spored. Additional characteristics of our species are the innumerable, very narrow cystidia (3-7 μm), that never exceed the basidia, and the cuticular structure with capitate hairs that are swollen at their septa. Yet, the most important microscopical feature distinguishing *L. mediterraneensis* is the cylindrical and very long dermatocystidia, which turn dark in SBA. We do not know of their presence in any other species of the Subg. *Piperites*.

We believe that *L. mediterraneensis* should be included in the Subg. *Piperites*, Sect. *Piperites*, Subsect. *Croceini*, because of its latex, which turns yellow within a few seconds and the filamentous cap margin, which quickly becomes glabrous.

ACKNOWLEDGEMENTS

We are deeply indebted to J.L. Siquier, M.A. López de Gregorio, A. Ramírez, J. Vila, M. Aguasca, J.M. Pérez, E. Descals for their help in collecting *L. mediterraneensis*. The English translation by E. Descals is greatfully acknowledged. We thank Z. Sodán from the Univerzity Karlovy, Praha, for providing information regarding *L. intermedius* in the early work of J. V. Krombholz.

LITERATURE CITED

BON, M. (1980).- Clé monographique du genre *Lactarius*. *Documents Mycologiques*, ***10(40)***: 1-85.

BON, M. (1983).- Notes sur la systématique du genre *Lactarius*. *Documents Mycologiques*, ***13(50)***: 15-28.

HESLER, R.L. & A.H. SMITH (1979).- North American species of *Lactarius*. University of Michigan Press, Michigan, 841 pp.

KONG, A. & A. ESTRADA (1994).- A new species of *Lactarius* from Mexico. *Mycotaxon*, ***52(2)***: 443-466.

KROMBHOLZ, J.V. (1848).- Naturgetreue Abbildungen und Beschreibungen der essbaren Schwämme, *8*: 11, tab. 58, figs. 11-13.

KYTÖVUORI, I. (1984).- *Lactarius* Subsectio *Scrobiculatini* in NW Europe. *Karstenia*, ***24***: 41-72.

MARCHAND, A. (1980).- Champignons du Nord et du Midi. Vol 6. Hachette, Perpignan, 291 pp.

MOSER, M. (1980).- Guida alla determinazione dei funghi. Saturnia, Trento, 565 pp.

NEUHOFF, W. (1956).- Die Milchlinge. J. Klinkhard, Bad Heilbrunn, 248 pp.

MYCOTAXON

Volume LVII, pp. 187-194 January-March 1996

NOTES ON HYPHOMYCETES. LXIX. CONCERNING SPORIDESMIUM MACLURAE AND ITS SYNONYM CERCOSPORA MACLURAE, THE CAUSAL ORGANISM OF LEAF-BLOTCH OF OSAGE-ORANGE (MACLURA POMIFERA), RECLASSIFIED IN PSEUDOCERCOSPORA

GARETH MORGAN-JONES and RYAN A. PHELPS

Department of Plant Pathology, College of Agriculture,
Auburn University, Alabama 36849

ABSTRACT

Sporidesmium maclurae Thüm., the causal organism of leaf-blotch of osage-orange, is redescribed and illustrated from its type material and from fresh collections made in Alabama, where it is of common occurrence. The fungus is reclassified in the genus *Pseudocercospora* Speg., as *P. maclurae* (Thüm.) Morgan-Jones & Phelps, being closely similar to its type species, *P. vitis* (Lév.) Speg. Comments are made on the heterogeneity of *Pseudocercospora* as presently constituted. *Cercospora maclurae* Ell. & Everh. is considered to be a synonym of *P. maclurae*.

INTRODUCTION

The anamorph fungus known as *Sporidesmium maclurae*, when first named and described by F.K.A.E.J. de Thümen in his *Mycotheca universalis*, was given the following diagnosis: "S. acervulis hypophyllis, tenuissimis, laxe effusis, velutinis, olivaceis, sine macula et folia lamina saepe vix decolorans; sporis longissime angustato-clavulatis, vertice truncato-rotundatis, longe stipitatis, plerumque curvatis, sex-decemseptatis, ad septa non vel vix constrictis, olivaceo-fuscis, magno nucleatis, 24-36, plerumque 30 mm longis (sine pedicello), 6 mm. crassis, pedicello aequilongo, hyalino, subaequali.". The fungus had been collected on living leaves of *Maclura aurantiaca* Nutt. [= *Maclura pomifera* (Raf.) Schneid.] at Aiken, South Carolina in July 1876 by H.W. Ravenel. The taxon appeared as No. 2074, part of Century XXI [Nos. 2001-2100] of the exsiccati, issued in Vienna, Austria, in 1881, with the diagnosis published on the label. Diagnoses of new species issued in centuries I through XVIII of de Thümen's *Mycotheca universalis*, together with nomenclatural changes, were also published separately in a series of papers but the remaining five centuries, including XXI, do not appear to have been similarly treated (Stevenson, 1971). The binomial *Sporidesmium maclurae* was, nevertheless, validly published. According to Article 31 of the ICBN the requirement for publication of a diagnosis independently of specimens issued in exsiccati in order to validate does not apply to names established prior to 1 January 1953. Names in exsiccati distributed before that date are validly published if they meet the printed matter requirements of Article 29 of the ICBN, which *S. maclurae* does. Duplicates of the type material of this fungus were, incidentally, issued in Roumeguère's *Fungi Selecti Gallici Exsiccati* [Century XLVII, No. 4696, issued at Toulouse, France, in 1888].

Ellis and Everhart (1902) described a new species of *Cercospora* Fresen., based on a collection on living leaves of *Maclura aurantiaca* made by George Washington Carver in Tuskegee, Alabama, in 1901. It was named *Cercospora maclurae* Ell. & Everh. and given the following description: "Hypophyllous, forming irregularly shaped, olive-green patches 2-4 mm., diam., partly limited by the veinlets of the leaf but not on any definite spots; hyphae cespitose, short (8-10 X 5 µ) continuous, nearly hyaline. Conidia obclavate, the lower broader part olive brown, 5-7-septate and slightly constricted at the septa, abruptly contracted above into a cylindrical, subhyaline beak which forms about half the length of the spore.". Chupp (1953), in his monograph of *Cercospora*, noted that *C. maclurae*, because of producing thick-walled, *Alternaria*-shaped conidia, was not considered to be a *Cercospora* but rather a *Pseudocercospora*. No reclassification was, however, made. Farr *et. al.* (1989) listed both *Sporidesmium maclurae* and *Cercospora maclurae* as occurring on *Maclura pomifera*, but it is evident that the two taxa are conspecific. Since *S. maclurae* is the oldest name it has date priority and *C. maclurae* is, therefore, a facultative synonym.

Sporidesmium maclurae appears to occur commonly on living leaves of bow-wood or osage-orange [*Maclura pomifera*] in the southeastern United States (personal observations). Records exist of its occurrence in Missouri and Texas, as well as Alabama and South Carolina (Farr *et. al.*, 1989). A recent fresh collection made in Alabama, and examination of the type material of *Sporidesmium maclurae*, have allowed an opportunity to study the fungus and reconsider its classification. We are in agreement with Charles Chupp that it is not a *Cercospora* and that it would be more satisfactorily classified in *Pseudocercospora*. A new combination is therefore proposed herein and the species is redescribed and illustrated. It has not been possible to examine the type collection of *Cercospora maclurae* housed at The New York Botanical Garden since it was out on loan to another researcher at the time this study was conducted. We have no doubt, however, that this binomial was applied to the same fungus.

COMMENTS ON PSEUDOCERCOSPORA

When Deighton (1976, 1979) adopted the name *Pseudocercospora* for over two hundred species of *Cercospora*-complex anamorphs, an essentially broad generic concept was employed. It was conceded that considerable variation existed among the included taxa in habit and morphology, as well as in conidiophore growth peculiarities in relation to conidiogenesis. It was stated (Deighton, 1976) that it might be possible to subdivide the genus into smaller, more homogeneous taxonomic entities but the author remained unconvinced at the

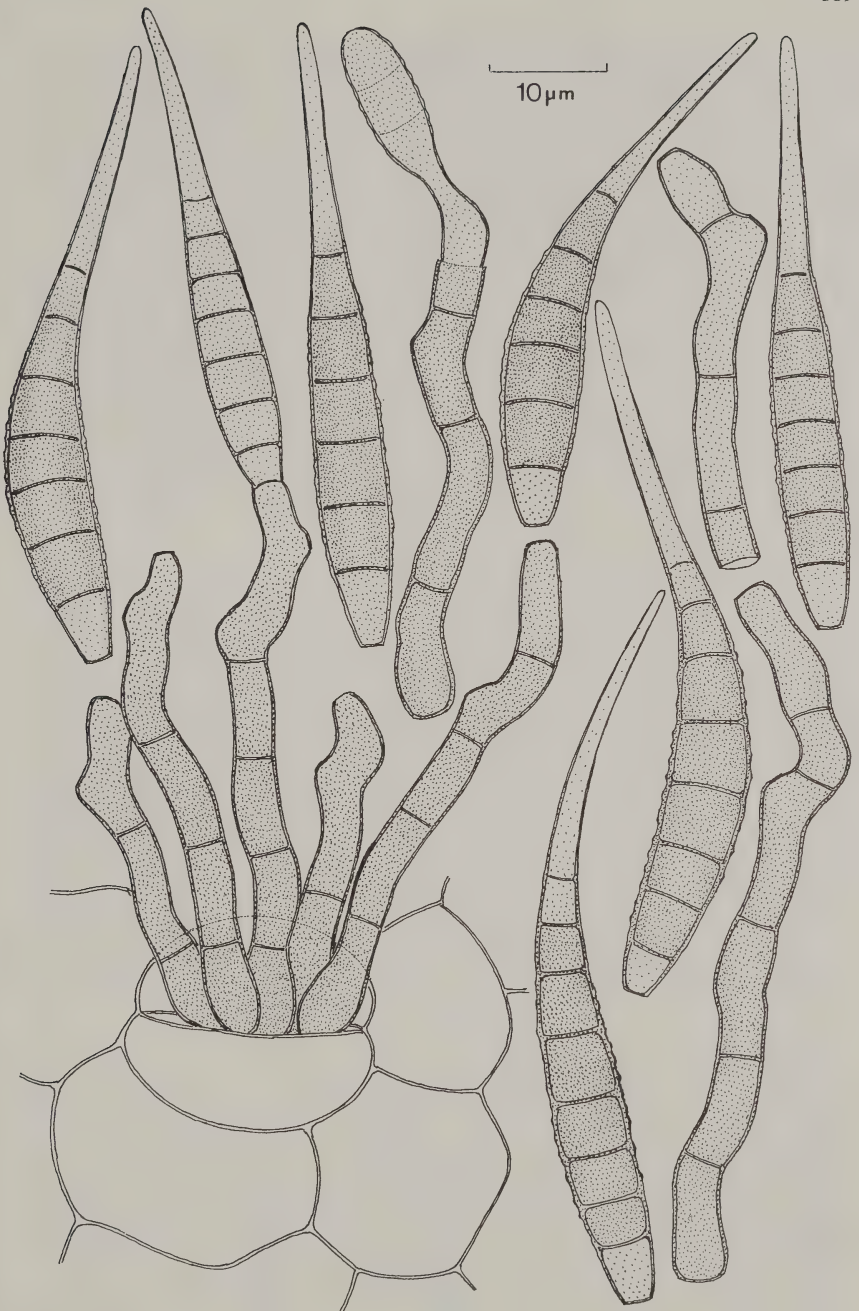


FIGURE 1. *Pseudocercospora maclurae*. Conidiophores and conidia.

time of the practicality of that action. The genus has remained a large, heterogeneous agglomeration of taxa but more and more species continue to be added to it. In terms of conidial morphology, form of conidiogenous loci, and conidiogenous cell proliferation much variation exists and a reevaluation of *Pseudocercospora* is long overdue. In some species, including the type, conidia are obclavate, rostrate, thickish-walled and brown, whereas in others they are cylindrical, appreciably thinner-walled, and pale olivaceous in color. Conidia are produced either at the tips of conical denticles or at broad, flat, unthickened, non-protuberant conidiogenous loci, reminiscent of those of *Mycocentrospora* Deighton. Some species have well-developed stromata, others not. Conidiophore proliferation can be both percurrent and sympodial or only sympodial. Some taxa have the growth habit of *Mycovellosiella* Rangel, the majority do not. The problem here, as in many other genera belonging to this complex, is that although seemingly discrete groups of species can be recognized, there exist anomalous, unusual taxa that are intermediates and bridge some of the main differentiating features. Nevertheless, a break-up of *Pseudocercospora* into more meaningful, smaller entities seems desirable. Sutton *et al.* (1987) and Sutton and Pascoe (1988) alluded to the need for generic reorganization but, like Deighton (loc. cit.), realized the difficulties faced in achieving a more satisfactory classification.

TAXONOMIC PART

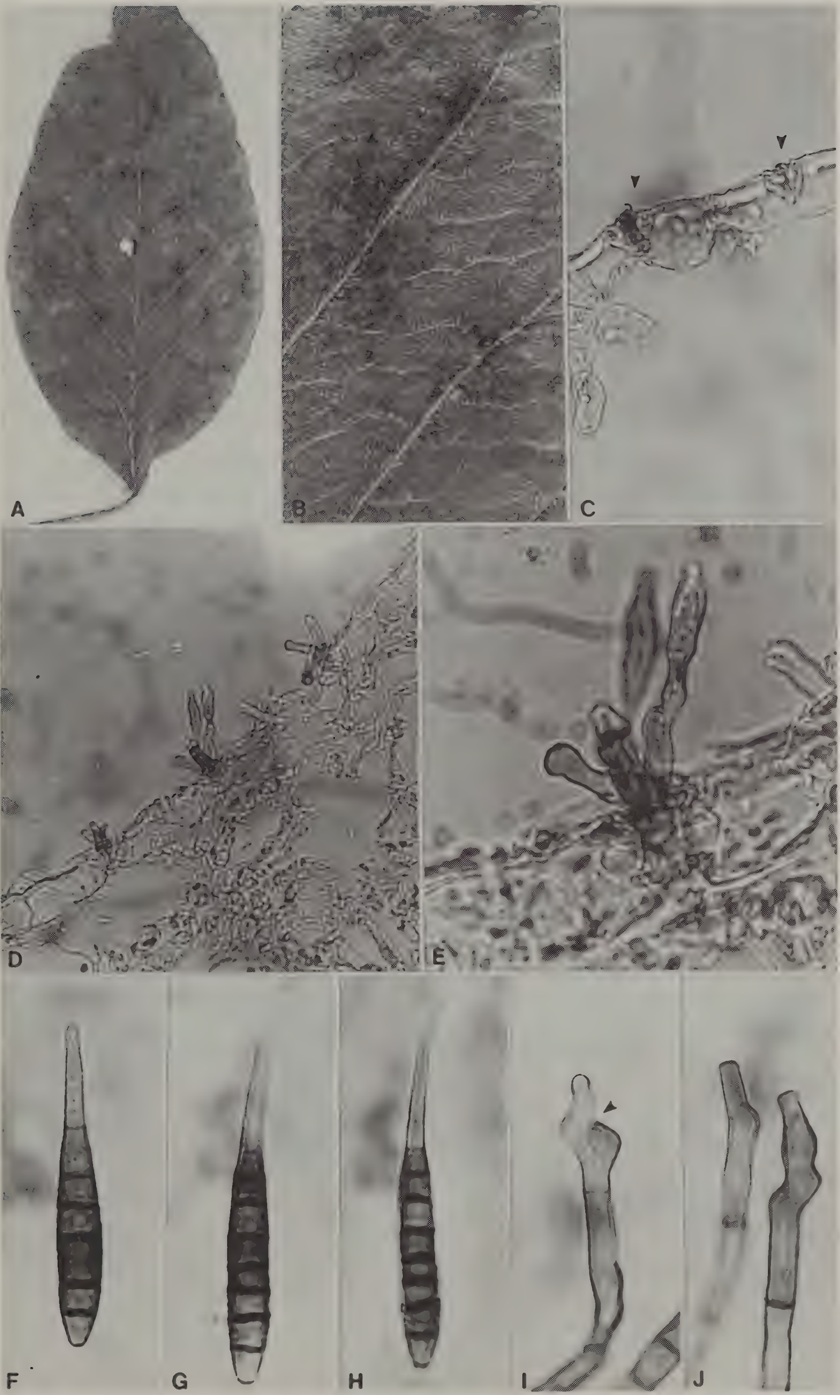
Pseudocercospora maclurae (Thüm.) comb. nov. (Figures 1 and 2).

≡ *Sporidesmium maclurae* Thümen, *Mycotheca universalis* No. 2074, anno 1881.

= *Cercospora maclurae* Ellis & Everhart, *J. Mycol.* 8:72, 1902.

Distinct, well-defined leaf spots absent. Chlorotic leaf discoloration amphigenous, localized and evident as irregular to more or less suborbicular, small, gregarious, pale yellowish-brown to beige-brown or cinnamon-brown blotches or patches, varying in size, spreading up to 5mm in diameter and often becoming diffuse and coalescing. Leaf blotches not always readily apparent, especially in young leaves where there is usually very little discoloration. Caespituli hypophyllous, often abundant, becoming visible with conidiation as blackish, extensive, occasionally dense, sooty-appearing patches on the abaxial

PLATE 1. *Pseudocercospora maclurae*. A & B, abaxial surface of host leaf showing large numbers of conidia appearing as dark blotches [A, reduced 10%; B, X 3]; C-E, abaxial surface of host leaf shown in cross section; C, two stomata (indicated by arrows), one conspicuously obstructed by conidiophores with signs of a stroma [X 350]; D & E, fascicles of conidiophores, some bearing conidia, emerging from stomata [D, X 320; E, X 900]; F-J, mature conidia and sympodial conidiophores (arrow in I indicating regenerative percurrent proliferation) [X 1000].


A
B
C
D
E
F
G
H
I
J

leaf surface. Mycelium immersed, ramifying intercellularly between mesophyll parenchyma, accumulating in substomatal cavities to give rise to stromata, composed of smooth, branched, subhyaline to very pale olivaceous-brown, septate, 2-3µm wide hyphae. Stroma substomatal, more or less subglobose, variously developed, up to 18µm in diameter, composed of interwoven, slightly inflated hyphae. Conidiophores emerging through the stomata in facicles of up to five, or occasionally more, macronematous, mononematous, originating from stromatic cells, flexuous, simple, cylindrical, septate, pale brown, often somewhat geniculate, sympodial, 84-146[112] X 4.5-5µm, with thin conidial scars lying flat against the periclinal wall or sometimes barely visible on wide shoulders. Conidiophores sometimes showing percurrent regenerative proliferation, independent of conidiogenesis. Conidiogenous cells integrated, terminal or intercalary, monoblastic or polyblastic. Conidia produced holoblastically, acropleurogenous, solitary, dry, straight or, more often, slightly curved, obclavate, distinctively rostrate, attenuating to a narrow apex, conicotruncate at the base, mid brown with the basal and apical cells paler, smooth or, more frequently, rugulose, relatively thick-walled, 5 to 8-septate, 60-81 X 7-8.5µm.

On living leaves of *Maclura pomifera* (Raf.) Schneid. [Moraceae]; North America.

Collections examined: on *M. pomifera* [as *M. aurantiaca*], Aiken, South Carolina, July 1876, de Thümen, *Mycotheca universalis* No. 2074, BPI, type; on *M. pomifera*, Evergreen, Conecuh County, Alabama, August 17, 1985, A.R. Diamond, AUA; on *M. pomifera*, Dadeville, Tallapoosa County, Alabama, August 27, 1994, R.A. Phelps, AUA.

DISCUSSION

In conidium morphology, including shape, coloration and surface ornamentation, *Pseudocercospora maclurae* is very similar to the type species *P. vitis*. In any generic revision it would belong to *Pseudocercospora sensu stricto*. It differs in that the conidiogenous cells are not denticulate. The enteroblastic, repetitive, percurrent regenerative growth that is commonly seen in *P. vitis* conidiophores rarely occurs in *P. maclurae* and the stromata in the later are not as well developed.

Pseudocercospora, even in a much narrower circumscription than presently accepted, would, in all probability, have to include species with conidiogenous loci varying in position from being situated terminally on long or short denticles or on distinctly visible or obscure shoulders on the conidiophore periclinal wall. There is much variation in this regard, even among taxa that have otherwise morphologically similar conidia and conidiophores. Likewise in the matter of enteroblastic regenerative percurrent growth, referred to as 'pseudo-percurrent' or 'pseudo-annellate' by Deighton (1976). In a species such as *P. kenemensis* Deighton, in common with *P. maclurae*, little, if any, percurrent growth occurs. The conidial scars in the former species lie flat against the lateral conidiogenous cell wall and are barely discernible or form a small shoulder or, when terminal, occur at the apex of a short peg. In *P. correae* Sutton & Pascoe, and perhaps some other species, percurrent as well as sympodial growth occurs in association with conidium development (Sutton *et al.*, 1987). Similar fungi which produce a plurality of conidia exclusively by sequential percurrent growth were classified by Deighton (1983) in *Stigmina* Sacc., another genus that is now very heterogeneous. Quite clearly a continuum exists in the matter of conidiophore growth peculiarities in this complex, which considerably complicates the task of delineating homogeneous generic taxa.

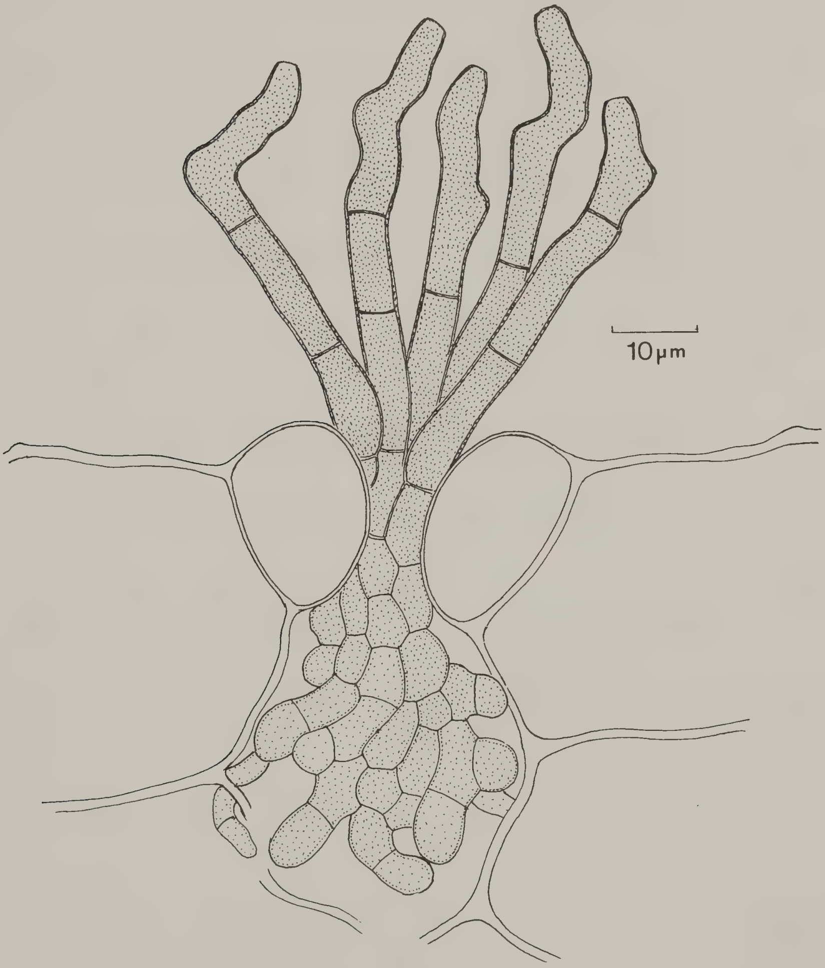


FIGURE 2. Vertical section through stomate of *Maclura pomifera* infected by *Pseudocercospora maclurae*; showing substomatal stroma and conidiophores.

ACKNOWLEDGEMENT

We thank Dr. Amy Y. Rossman, U.S. National Fungus Collections (BPI), for affording us the opportunity to examine the de Thumen exsiccatum. Dr. J. Leland Crane, Illinois Natural History Survey, provided a presubmission review of the manuscript for which we are grateful.

LITERATURE CITED

CHUPP, C. 1953. A monograph of the fungus genus *Cercospora*. Ithaca, New York, 667 pp.

DEIGHTON, F.C. 1976. Studies on *Cercospora* and allied genera. VI. *Pseudocercospora* Speg., *Pantospora* Cif. and *Cercoseptoria* Petr. *Mycol. Pap.* 140:1-168.

DEIGHTON, F.C. 1979. Studies on *Cercospora* and allied genera. VII. New species and redispositions. *Mycol. Pap.* 144:1-56.

DEIGHTON, F.C. 1983. Studies on *Cercospora* and allied genera. VIII. Further notes on *Cercoseptoria* and some new species and redispositions. *Mycol. Pap.* 151:1-13.

ELLIS, J.B. and B.M. EVERHART. 1902. New Alabama fungi. *J. Mycol.* 8:62-73.

FARR, D.F., G.F. BILLS, G.P. CHAMURIS and A.Y. ROSSMAN. 1989. Fungi on plants and plant products in the United States. APS Press, St. Paul.

STEVENSON, J.A. 1971. An account of Fungus exsiccati; containing material from the Americas. *Beihefte zur Nova Hedwigia* 36. J. Cramer, Lehre. 563 pp.

SUTTON, B.C. and I.G. PASCOE. 1988. *Pseudocercospora correicola* sp. nov., another leaf pathogen of *Correa* species from Australia. *Aust. Syst. Bot.* 1:87-94.

SUTTON, B.C., I.G. PASCOE and I.K. SHARMA. 1987. *Pseudocercospora correae* sp. nov., a leaf pathogen of *Correa* species from Australia. *Aust. J. Bot.* 35:227-234.

MYCOTAXON

Volume LVII, pp. 195-200 January-March 1996

NOTES ON HYPHOMYCETES. LXX. A NEW SPECIES OF MELANOGRAPHIUM FROM INDIA, WITH COMMENTS ON THE GENUS

NEERAJ SRIVASTAVA

Department of Botany, University of Gorakhpur,
Gorakhpur 273009, India

and

GARETH MORGAN-JONES

Department of Plant Pathology, College of Agriculture,
Auburn University, Alabama 36849

ABSTRACT

A new species of *Melanographium* Saccardo, *M. calami* N. Srivastava, A.K. Srivastava & Kamal, collected in India on dead leaf sheaths of *Calamus tenuis* Roxb., is described and illustrated. The history of the genus and the nomenclature of its taxa are reviewed and a key to its species is provided.

INTRODUCTION

The generic name *Melanographium* was established by Saccardo (1913), with *M. spleniosporum* Sacc. as its type species. It remained monotypic for forty-five years until Hughes (1958) added a second taxon, *Melanographium fasciculatum* Hughes, a *nomen novum* for *Monotospora fasciculata* Sacc. The latter could not be employed for purposes of making a nomenclatural transfer because of it being a later homonym of *Monotospora fasciculata* Cooke & Massee, a name based on another fungus which is now classified in *Melanographium* and presently known as *M. cookei* M.B. Ellis. On the basis of date priority and presumed conspecificity, Hughes (loc. cit.) took up *Cordella spinulosa* Spegazzini as the valid binomial for the type species of *Melanographium*, making the recombination *Melanographium spinulosum* (Speg.) Hughes and listing both *Monotospora fasciculata* Cooke & Massee and *Melanographium spleniosporum* as facultative synonyms. Two other binomials, *Pseudocamptoum citri* Fragoso & Ciferri and *Sporostachys maxima* Sacc. [≡ *Melanographium maximum* (Sacc.) Sacc.], on which their respective generic names are based, were also listed (Hughes, loc. cit.) as facultative synonyms of *M. spinulosum*, as was *Cordella tomentosa* Speg., described two years after *C. spinulosa* (Spegazzini, 1888). Mason (1933) had earlier thought *Cordella spinulosa* to be an older name for *Pseudocamptoum citri*. Type or authentic material of neither *M. spleniosporum* nor *P. citri* had been examined by Hughes. Presumably, therefore, these were included in the nomenclator tentatively and provisionally. The name of the type species was changed, however, without study of the specimen on which the original binomial was based.

The genus *Sporostachys* Sacc. had two original species, *S. maxima* and *S. anceps* Sacc. (Saccardo, 1917), both of which were subsequently transferred into *Melanographium* (Saccardo and Trotter, 1931). Following examination of the type material of the second species, Hughes (loc. cit.) determined that the name *Sporostachys anceps* [≡ *Melanographium anceps* (Sacc.) Sacc.] is a *nomen confusum*. Saccardo's diagnosis of this taxon was apparently based on discordant elements. The binomial *S. anceps* was evidently applied to conidiophores of *S. maxima* and conidia of *Chlamydomyces palmarum* (Cooke) Mason, which were incorrectly assumed to belong to the same fungus.

Subramanian (1962) considered *Cordella* Speg. to be an earlier generic name for *Melanographium* and made the recombination *Cordella fasciculata* (Hughes) Subramanian. *Melanographium spinulosum* was described by this author under the name *Cordella spinulosa* (Subramanian, 1962; 1971). Of the two original species of *Cordella*, *C. coniosporioides* Speg. and *C. spinulosa*, Hughes (loc. cit.) chose the former as its lectotype. Subramanian (1962), however, chose *C. spinulosa* as lectotype, expressing the opinion that *C. coniosporioides* appears to be a species of *Papularia* Fr. *Papularia* is now considered to be a synonym of *Arthrinium* Kunze and *Cordella* is accepted as a free-standing genus, with *C. coniosporioides* as its lectotype (see Hughes, loc. cit.; Ellis, 1971). On account of the presence of setae *Cordella* is considered to differ sufficiently from *Arthrinium* to warrant separate identity. Subramanian (1962) made no mention of the presence of setae in his treatment of *C. coniosporioides*, although these were noted as 'hyphis sterilibus' in the original diagnosis of the species (Spegazzini, 1886). Subramanian's taxonomy and lectotypification have not withstood the tests of time and scrutiny. *Cordella coniosporioides* and *C. spinulosa* are clearly not congeneric and classification of the latter in *Melanographium* seems satisfactory. Subramanian (1971) followed Hughes' nomenclator and included *Trichosporum selenioides* Sacc. & Paoletti, as well as *Monotospora fasciculata* Cooke & Massee, *Melanographium spleniosporum*, *Sporostachys maxima* and *Pseudocamptoum citri* as synonyms of *C. spinulosa*.

Melanographium thunbergiae Raghuveer was described from India (Rao, 1962) and compared with *M. anceps*. The fungus was reported to have small, ellipsoid to oval conidia, and was considered to be closer to *M. anceps* than other species of *Melanographium* on account of the latter having lenticular or reniform conidia. The comparison with *M. anceps* was clearly meaningless on two accounts. Firstly, because of the *nomen confusum* status of this name and, secondly, the fact that *M. thunbergiae* conidia are not even remotely similar to those of *Chlamydomyces palmarum* (on which, as mentioned above, the name *M. anceps* is partly based). *Melanographium thunbergiae* was reported to have denticulate conidiophores, a characteristic, together with the morphology of its conidia, which is at variance with the generic concept. A reevaluation of the appropriateness of the classification of this taxon in *Melanographium* is desirable.

Ellis (1963) published a comprehensive treatment of *Melanographium*, except that *M. thunbergiae* was not mentioned. Significant revisions to its classification were made. *Melanographium spinulosum* and several other taxa listed as synonyms by Hughes (loc. cit.) were shown to be different entities from *Melanographium spleniosporum*, the original type species. *Trichosporum selenioides*, however, was determined to be the oldest binomial applied to the fungus on which the genus is based. Accordingly the recombination *Melanographium selenioides* (Sacc. & Paol.) M.B. Ellis was made and is the currently accepted name, with *M. spleniosporum* as its synonym. *Sporostachys maxima* is an additional facultative synonym of *M. selenioides*. *Melanographium spinulosum*, the binomial adopted by Hughes (loc. cit.) for the type species, was found to be based on a different but congeneric fungus; likewise, *Monotospora fasciculata* Cooke & Massee. Since a transfer of the latter into *Melanographium* would create a later homonym of *M. fasciculatum* Hughes, the *nomen novum Melanographium cookei* M.B. Ellis was established for this species (Ellis, loc. cit.). *Pseudocamptoum citri* was also found to be different and the transfer *Melanographium citri* (Frag. & Cif.) M.B. Ellis accordingly made, thus bringing the total number of species in the genus up to five. *Melanographium trachycarpi* Hino & Katumoto, described the previous year [*J. Jap. Bot.* 37:298, 1962] is a later name for *M. citri* (Ellis, loc. cit.). Saikia and Sarbhoy (1981) added a novel species, collected in Assam, India, *Melanographium indicum* Saikia & Sarbhoy. An additional species from India is described herein.

TAXONOMIC PART

Melanographium calami N. Srivastava, A.K. Srivastava et Kamal (Figure 1).

Coloniae effusae, velutinae, atro-brunneae. Mycelium immersum, ex hyphis ramosis, septatis, laevis, crassi-tunicatis, pallide-brunneis vel brunneis, 2-4.5μm latis compositum. Stromata partim immersa vel superficiale, pseudoparenchymatica, ex cellulis brunneis vel atro-brunneis composita, usque ad 80μm lata X 60μm alta [30-80 X 35-60μm]. Conidiophora ex cellulis superis stromatum oriunda, macronemata, mononemata, caespitosa, patula, simplicia, leniter flexuosa, laevia, brunnea vel atro-brunnea, apicem versus pallidiora, usque ad 6-septata, 100-300μm longa, ad basim 5-7μm lata, apicem versus 5-8μm lata. Cellulae conidiogenae terminales, in conidiophoris incorporatae, integratae, polyblasticae, indeterminatae, sympodiales, cylindricae, cicatricatae; cicatrices conidiales non incrassatae, inconspicuae. Conidia acrogena, solitaria, sicca, continua, laevia, parietibus crassis, graviter curvata, plus minusve hippocrepiformia, brunnea vel atro-brunnea, rare fissura longitudinali hyalina ornata, 16-25μm diametro, ad centrum 10-13μm lata.

In vaginis foliis mortuis *Calami tenuis*, Barhani, Siddhartha Nagar, Uttar Pradesh, India, March 1992, N. Srivastava, HCIO 30653, holotypus; GPU Herb. No. AK 1644, isotypus.

Colonies effuse, velvety, dark blackish-brown. Mycelium immersed, composed of branched, septate, smooth, thick-walled, pale brown to brown, 2-4.5µm wide hyphae. Stromata distinct, partly immersed to erumpent and more or less superficial, pseudoparenchymatous, composed of mostly isodiametric, brown to dark-brown cells, up to 80µm wide X 60µm high [30-80 X 35-60µm]. Conidiophores originating from the upper, outer cells of the stromata in loose or somewhat dense 80-300µm wide fascicles, macronematous, mononematous, caespitose, spreading, usually gently flexuous or straight, simple, erect to procumbent, smooth, brown to dark brown, somewhat paler toward the apex, up to 6-septate, 100-300µm long, 5-7µm wide at the base, 5-8µm wide toward the apex. Conidiogenous cells terminal, integrated, polyblastic, indeterminate, sympodial, cylindrical, bearing a number of unthickened, inconspicuous conidial scars. Conidia acrogenous, formed holoblastically at the apex of each conidiophore and from successively produced conidiogenous loci, solitary, dry, unicellular, smooth, thick-walled, very strongly curved giving a more or less horse-shoe aspect, brown to dark brown, rarely with a hyaline longitudinal slit, 16-25µm in diameter, 10-13µm wide at the broadest central part.

On dead leaf sheaths of *Calamus tenuis* Roxb. (Arecaceae); India.

Collection examined: on *C. tenuis*, Barhani, Siddhartha Nagar, Uttar Pradesh, India, March 1992, N. Srivastava, HCIO 30653, holotype; GPU Herb. No. AK 1644, isotype.

Melanographium calami is easily distinguishable from the other species of the genus described to date on the basis of the distinct morphology of its conidia. These somewhat resemble those of *M. indicum* but are much more strongly curved. Conidia of *Melanographium* vary from oval to limoniform to obclavate to reniform and are either straight or to various degrees curved.

KEY TO SPECIES OF MELANOGRAPHIUM

	Conidiophores arranged in synnemata	1
	Conidiophores caespitose, in dense or loose fascicles	2
1.	Conidia 15-23um long, reniform	*selenioides*
	Conidia 4-6um long, ellipsoid to oval	*thunbergiae*
2.	Conidia horseshoe-shaped	*calami*
	Conidia oval to reniform	3
3.	Conidia more or less straight	*fasciculatum*
	Conidia mostly curved	4
4.	Conidiophores up to 210um long	*indicum*
	Conidiophores up to 300um or more in length	5
5.	Conidiophores in loose fascicles, never over 1000um in length	*spinulosum*
	Conidiophores in dense fascicles, often over 1000um long	6
6.	Conidia 8-13um wide	*citri*
	Conidia 12-18um wide	*cookei*

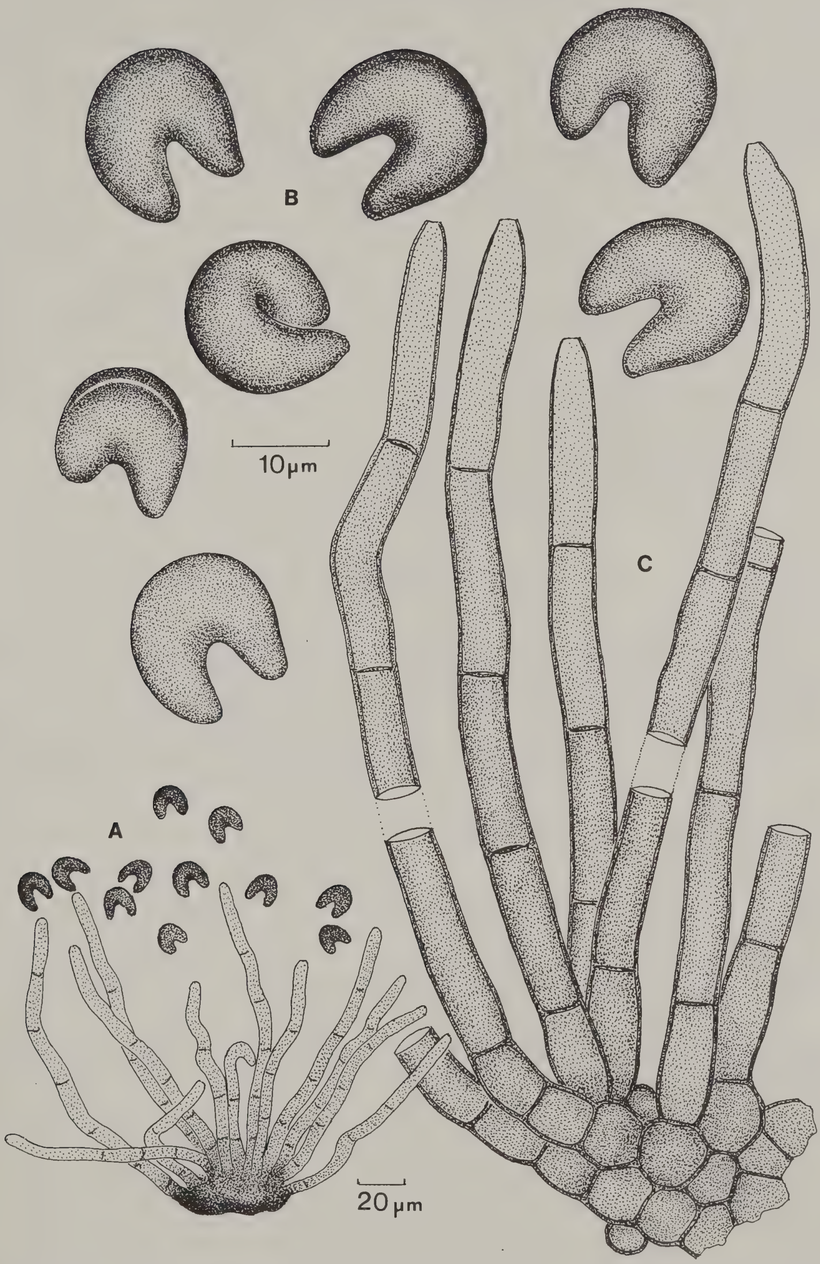


FIGURE 1. *Melanographium calami*. A, stroma, conidiophore fascicle and conidia; B, conidia; C, portion of stroma and conidiophores.

ACKNOWLEDGEMENT

The senior author thanks the Head, Department of Botany, University of Gorakhpur, for use of facilities and DST, New Delhi, for financial assistance. The manuscript was reviewed by Dr. Roger D. Goos, University of Rhode Island, for which we are grateful.

LITERATURE CITED

ELLIS, M.B. 1963. Dematiaceous Hyphomycetes. V. *Mycol. Pap.* 93:1-33.

ELLIS, M.B. 1971. Dematiaceous Hyphomycetes. CMI, Kew, England, 608 pp.

HUGHES, S.J. 1958. Revisiones hyphomycetum aliquot cum appendice de nominibus rejiciendes. *Can. J. Bot.* 36:727-836.

MASON, E.W. 1933. Annotated account of fungi received at the Imperial Bureau of Mycology, List II, (Fascicle 2). *Mycol. Pap.* 3:1-67.

RAO, P.R. 1962. Two new fungi from Hyderabad. *Curr. Sci.* 31:349-350.

SACCARDO, P.A. 1913. Notae Mycologicae. XVII. *Ann. Mycol.* 11:546-568.

SACCARDO, P.A. 1917. Notae Mycologicae. XXIII. *Atti Accad. Sci. Ven.-Trent.-Istr.* III, 10:57-94.

SACCARDO, P.A. and A. TROTTER. 1931. *Sylloge Fungorum* 25:1-1093.

SAIKIA, U.N. and A.K. SARBHOY. 1981. Hyphomycetes of north-eastern India - IV. The genus *Melanographium*. *Indian Phytopathol.* 34:365-367.

SPEGAZZINI, C. 1886. Fungi guaranitici. Pugillus I. *An. Soc. Cient. Arg.* 22:186-224.

SPEGAZZINI, C. 1888. Fungi guaranitici. Pugillus II. *An. Soc. Cient. Arg.* 26:1-76.

SUBRAMANIAN, C.V. 1962. Studies on Hyphomycetes - II. *Proc. Indian Acad. Sci.* Sect. B, 55:38-47.

SUBRAMANIAN, C.V. 1971. Hyphomycetes. An account of Indian species, except Cercosporae. ICAR, New Delhi, India, 930 pp.

MYCOTAXON

Volume LVII, pp. 201-209 January-March 1996

NOTES ON HYPHOMYCETES. LXXI.
NEW SPECIES OF STENELLA, STENELLOPSIS AND TRETOSPORA FROM NEPAL

RITESH K. CHAUDHARY and SANJAY K. SINGH

Department of Botany, University of Gorakhpur,
Gorakhpur 273009, India

and

GARETH MORGAN-JONES

Department of Plant Pathology, College of Agriculture,
Auburn University, Alabama 36849

ABSTRACT

New species of *Stenella* Sydow, *Stenellopsis* Huguenin, and *Tretospora* M.B. Ellis, are described and illustrated from collections made in the Kathmandu Valley, Nepal. They are *Stenella osyrina* R.K. Chaudhary & S.K. Singh, *Stenellopsis nepalensis* R.K. Chaudhary & S.K. Singh, and *Tretospora himalayana* R.K. Chaudhary & S.K. Singh, occurring on *Osyris wightiana* Wall., *Clausena pentaphylla* DC., and an unidentified species of *Daphne* L., respectively. Comparisons are made with morphologically similar species.

INTRODUCTION

The mountainous Himalayan country of Nepal experiences diverse climatic conditions and is characterized by a wide range of altitudinal variations, humidities, temperatures, and distribution of incident sunlight. These conditions are conducive for the occurrence and growth of numerous and varied foliicolous fungi, some causing necrotic leaf-lesion symptoms, others growing superficially on leaf surfaces. Nevertheless, the mycoflora of this remote area has not been explored to any great extent. In recent years a beginning has been made at exploring and documenting the many leaf-borne microfungi of the region, including members of the powdery mildews (Erysiphales), as well as a series of Deuteromycotina (Verma and Kamal, 1986; Budathoki *et al.*, 1989; Verma *et al.*, 1990; Khan *et al.*, 1991, 1993; Singh *et al.*, 1995). As a continuation of this study, three novel species, one each of the genera *Stenella*, *Stenellopsis* and *Tretospora*, are described and illustrated herein. In all cases the new taxa are the first of their genera to be recorded on their respective phanerogamic host families.

Alabama Agricultural Experiment Station Journal Series Number 18-954986

TAXONOMIC PART

Stenella osyrina R.K. Chaudhary et S.K. Singh, sp. nov. (Figure 1).

Maculae amphigenae, olivaceo-brunneae vel brunneae, margine fuscato angusto, primo parvae et orbiculares, deinde coalescentes et irregulariter, usque ad 5mm latae. Coloniae hypophyllae, effusae. Mycelium plerumque superficiale, ex hyphis septatis, ramosis, minute verruculosis, pallide brunneis, 2-2.5μm latis compositum. Stromata nulla. Conidiophora macronemata, mononemata, simplicia, ex hyphis superficialibus repentibus lateralia oriunda, recta vel leniter flexuosa, cylindrica, medio brunnea, apicem versus pallidiora, usque ad 8-septata, parietibus crassis, 40-126μm longa, 3-7.5μm crassa. Cellulae conidiogenae in conidiophoris integratae, terminales, polyblasticae, sympodiales, cicatricatae. Cicatrices conidiales conspicuae, incrassatae. Conidia acropleurogena, holoblastica, solitaria vel saepe catenulata, plerumque recta vel interdum leniter curvata, cylindrica, 1 ad 6-septata, pallide olivaceo-brunnea, verruculosa, apice obtusa, basi in hilum incrassatum, breviter attenuata, 15-48 X 2.5-6μm.

In foliis vivis *Osyris wightianae*, Kathmandu Valley, Nepal, November 1993, Kamal, HCIO 41548, holotypus; GPU Herb. No. 4005, AUA, isotypi.

Infection lesions amphigenous, olivaceous-brown to brown, more or less evenly colored but usually with a distinct, narrow, darker margin, mostly small, circular and discrete, later often coalescing and assuming an irregular shape; individual spots up to 5mm in diameter. Colonies hypophyllous, effuse. Mycelium mostly superficial, composed of septate, branched, interweaving, minutely verruculose, cylindrical, pale brown, repent, 2-2.5μm wide hyphae. Stromata absent or very rudimentary. Conidiophores macronematous, mononematous, simple, arising singly as lateral branches from superficial, repent hyphae, straight or very slightly flexuous, cylindrical, mid brown, becoming paler distally, thick-walled, up to 8-septate, usually with 3 or 4 transverse septa, 40-126μm long, 3-7.5μm wide. Conidiogenous cells integrated, terminal, polyblastic, sympodial, cicatrized. Conidial scars conspicuous, thickened. Conidia acropleurogenous, holoblastic, solitary or often catenulate in unbranched chains, or very rarely in a branched chain, mostly straight or sometimes slightly curved, more or less cylindrical, 1 to 6-septate, pale olivaceous brown to pale brown, sometimes very slightly constricted at the septa, verruculose, apex obtuse or bearing a thickened hilum following secondary conidial formation, attenuating slightly toward the base which also bears a thickened scar, 15-48 X 2.5-6μm.

On living leaves of *Osyris wightiana* Wall. (Santalaceae); Nepal.

Collection examined: on *O. wightiana*, Kathmandu Valley, Nepal, November 1993, Kamal, HCIO 41548, holotype; GPU Herb. No. 4005, AUA isotypes.

Stenella osyrina belongs to a group of species within the genus *Stenella* that produce abundant superficial mycelium but no stromata and have well-differentiated, distinctly macronematous conidiophores. Stromata are often

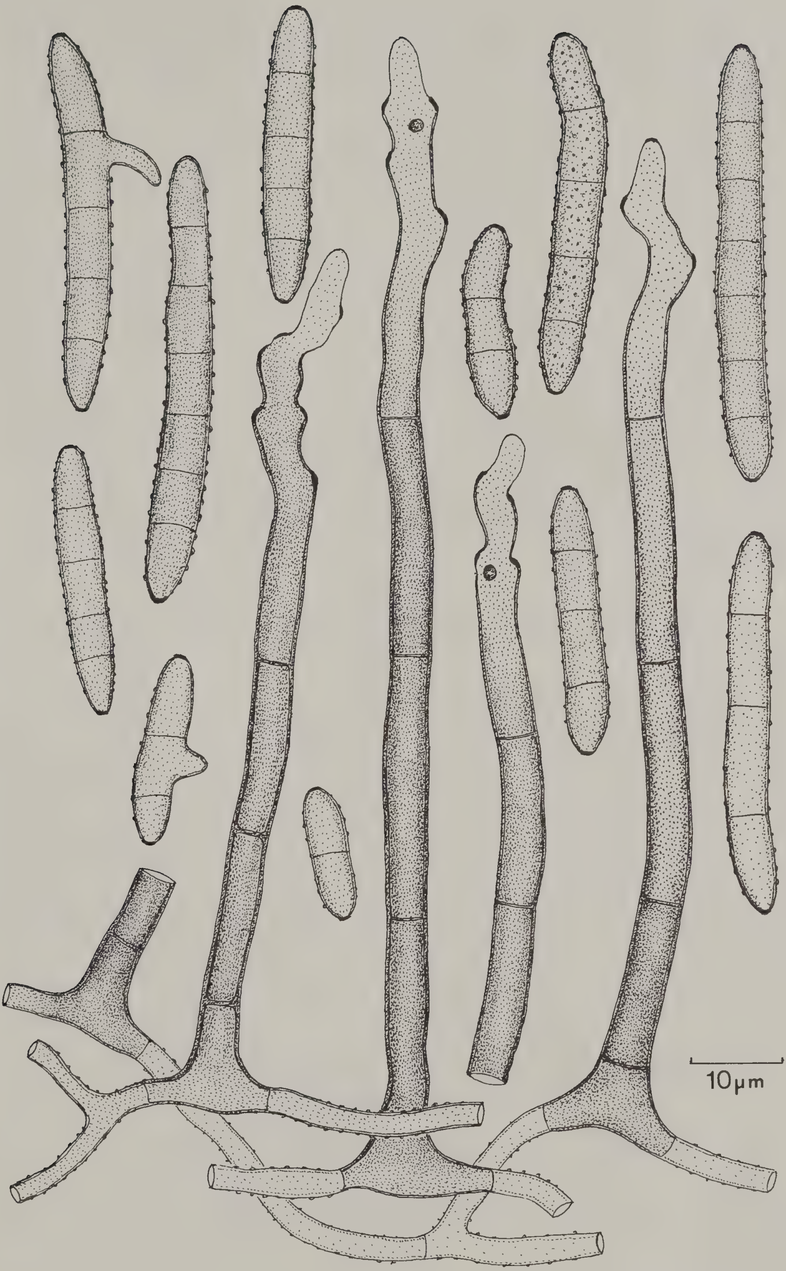


FIGURE 1. *Stenella osyrina*. Hyphae, conidiophores and conidia.

present in most species, though generally small and poorly developed (Ellis, 1971; 1976). In this regard it resembles species such as *C. canavaliae* (H. & P. Syd.) Deighton and *S. shoreae* Khan & Kamal (Deighton, 1971; Khan *et al.*, 1995). It is the only species of *Stenella* Sydow known to occur on a member of the Santalaceae.

Stenellopsis nepalensis R.K. Chaudhary et S.K. Singh, sp. nov. (Figure 2).

Maculae amphigenae, brunneae vel atrobrunneae, irregulariter orbiculares, usque ad 1.5cm latae, interdum coalescentes. Coloniae hypophyllae. Caespituli discreti, atrobrunnei, dense velutini, aequaliter disseminati. Mycelium immersum, ex hyphis ramosis, septatis, pallide olivaceo-brunneis, 2-2.5µm crassis compositum. Stromata immersa, atrobrunnea, pseudoparenchymatica, usque ad 50µm lata, ex cellulis brunneis, inflatis, compactis compositum. Conidiophora ex cellulis superis stromatum oriunda, macronemata, mononemata, non ramosa, 0 ad 1-septata, recta vel flexuosa, cylindrica, laevia, olivaceo-brunnea, 12-35µm longa, 2.5-6.5µm lata. Cellulae conidiogenae integratae, terminales, polyblasticae, sympodiales, cicatricatae. Cicatrices conidiales incrassatae. Conidia acropleurogena, holoblastica, solitaria, sicca, simplicia, cylindrica, recta vel flexuosa, pallide brunnea, verruculosa, usque ad 16-septata, interdum leniter constricta ad septa, apice obtusa, basi truncata, hilo incrassato, 27-125 X 3-8µm.

In foliis vivis *Clausenae pentaphyllae*, Naraingarh, Chitwan, Nepal, November 1993, Kamal, HCIO 41774, holotypus; GPU Herb. No. 3176A, AUA, isotypi.

Leaf lesions amphigenous, brown to dark brown, visibly darker on the adaxial surface, more or less circular or somewhat irregular in shape and extent, up to 1.5cm wide, sometimes coalescing to form larger discolored patches. Colonies hypophyllous. Caespituli discrete, small, dark brown to blackish, densely velutinous, distributed evenly over the leaf lesion. Mycelium immersed, composed of branched, septate, pale olivaceous-brown, 2-2.5µm wide hyphae. Stromata immersed, dark brown, pseudoparenchymatous, up to 50µm wide, composed of brown, inflated, isodiametric, compact cells. Conidiophores originating from the upper, outer cells of the stromata, macronematous, mononematous, unbranched, 0 or 1-septate, straight or slightly flexuous, cylindrical, smooth, olivaceous-brown, 12-35µm long, 2.5-6.5µm wide. Conidiogenous cells integrated, terminal, polyblastic, sympodial, cicatrized. Conidia acropleurogenous, holoblastic, solitary, dry, simple, cylindrical, straight or slightly flexuous or gently curved, pale brown, verruculose, up to 16-septate, sometimes slightly constricted at the septa, obtuse at the apex, truncate at the base which bears a thickened hilum, variable in size, 27-125 X 3-8µm.

On living leaves of *Clausena pentaphylla* DC. (Rutaceae); Nepal.

Collection examined: on *C. pentaphylla*, Naraingarh, Chitwan, Nepal, November 1993, S.K. Singh, HCIO 41774, holotype; GPU Herb. No. 3176A, AUA, isotypes.

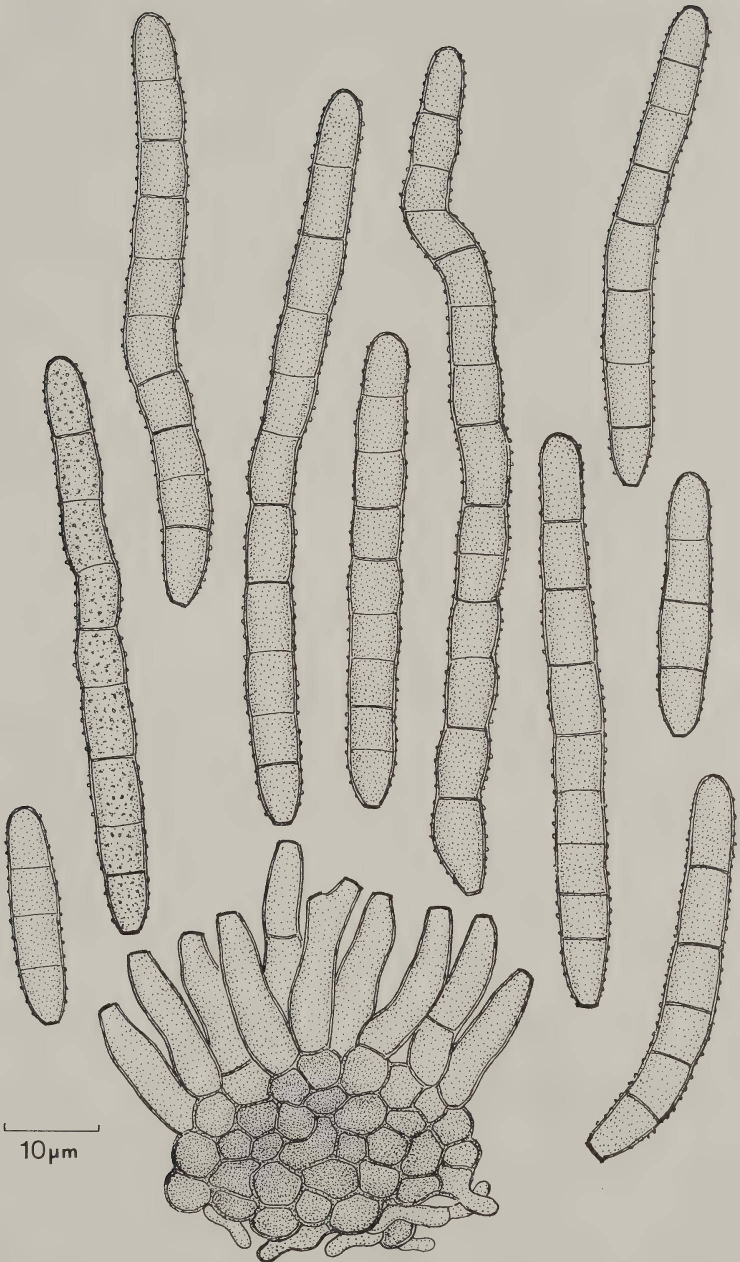


FIGURE 2. *Stenellopsis nepalensis.* Stroma, conidiophores and conidia.

Stenellopsis nepalensis is the fourth species of the genus to be discovered. *Stenellopsis* was established to accommodate a single species, *S. fagraeae* Huguenin, occurring on leaves of *Fagraea schlechteri* Gilg & Benedict in New Caledonia (Huguenin, 1966). A second species was added to the genus when Singh (1979) described *S. shoreae* S.M. Singh [as *S. shorae*], found on leaves of *Shorea robusta* Gaertn. in India. More recently *S. xeromphigena* K. Srivastava, A.K. Srivastava & Kamal was named, based on a collection made on *Xeromphis uliginosa* (Retz.) Maheshwari [≡ *Catunaregam uliginosa* (Retz.) V.V. Sivarajan] in northeastern Uttar Pradesh, India (Srivastava *et al.*, 1993). *Stenellopsis nepalensis* differs from the previously described species in the dimensions of its conidia and conidiophores, and in degree of conidial septation. In conidium size it comes closest to the type species, *S. fagraeae*. In that species, however, the stromata are less well developed, being rudimentary and largely prosenchymatous in texture. All four species of *Stenellopsis* occur on different phanerogamic host plant families.

Stenellopsis Morgan-Jones, an inadvertently created later homonym of *Stenellopsis* Huguenin, was established (Morgan-Jones, 1980) to accommodate *Heterosporium magnoliae* Weedon, a unique fungus occurring on leaves of *Magnolia grandiflora* L. in the southeastern United States. This taxon, which was reclassified as *Parastenella magnoliae* (Weedon) J.C. David (David, 1991), bears no relation to species of *Stenellopsis*. The genus *Parastenella* J.C. David remains monotypic.

Tretospora himalayana R.K. Chaudhary et S.K. Singh, sp. nov. (Figure 3).

Coloniae hypophyllae, effusae, fuscae. Mycelium superficiale, ex hyphis ramosis, hyphopodiatis, repentibus, reticulatis, septatis, laevis, pallide brunnea vel medio brunnea, usque ad 4.5µm crassis compositum. Hyphopodia irregularia vel bilateralia, subglobosa vel oblonga, olivacea vel pallide brunnea, 5-16 X 3-11µm. Conidiophora macronemata, mononemata, ex hyphis superficialibus lateraliter et singulariter oriunda, parva, erecta, non-ramosa, aseptata, laevia, olivaceo-brunnea, ad apicem fusca vel atra, 10-13.5 X 3-8µm. Cellulae conidiogenae integratae, in conidiophoris incorporatae, enteroblasticae, monotreticae. Conidia solitaria, in apice conidiophori per porum oriunda, sicca, recta vel curvata, simplicia, plerumque obclavata, rostrata, brunnea vel atrobrunnea, laevia, 3 ad 12-pseudoseptata, ad basim conico-truncata, hilo atra, ad apicem obtusa vel subacuta, 55-184 X 10-16µm.

In foliis vivis *Daphne*, Kathmandu Valley, Nepal, November 1993, Kamal, HCIO 41503, holotypus; GPU Herb. No. 4006, AUA, isotypi.

Colonies hypophyllous, effuse, dark blackish brown. Mycelium superficial, composed of a network of branched, anastomosing, interwoven, repent, septate, pale to mid brown, smooth, hyphopodiate, up to 4.5µm wide hyphae. Hyphopodia irregularly produced or bilateral, more or less subglobose, or oblong with an obtuse apex, or somewhat irregular in shape, olivaceous to pale brown, 5-16 X 3-11µm. Conidiophores macronematous, mononematous, arising laterally and singly from the superficial hyphae, short, straight or very slightly curved, erect, smooth, olivaceous brown, blackish at the extreme apex,

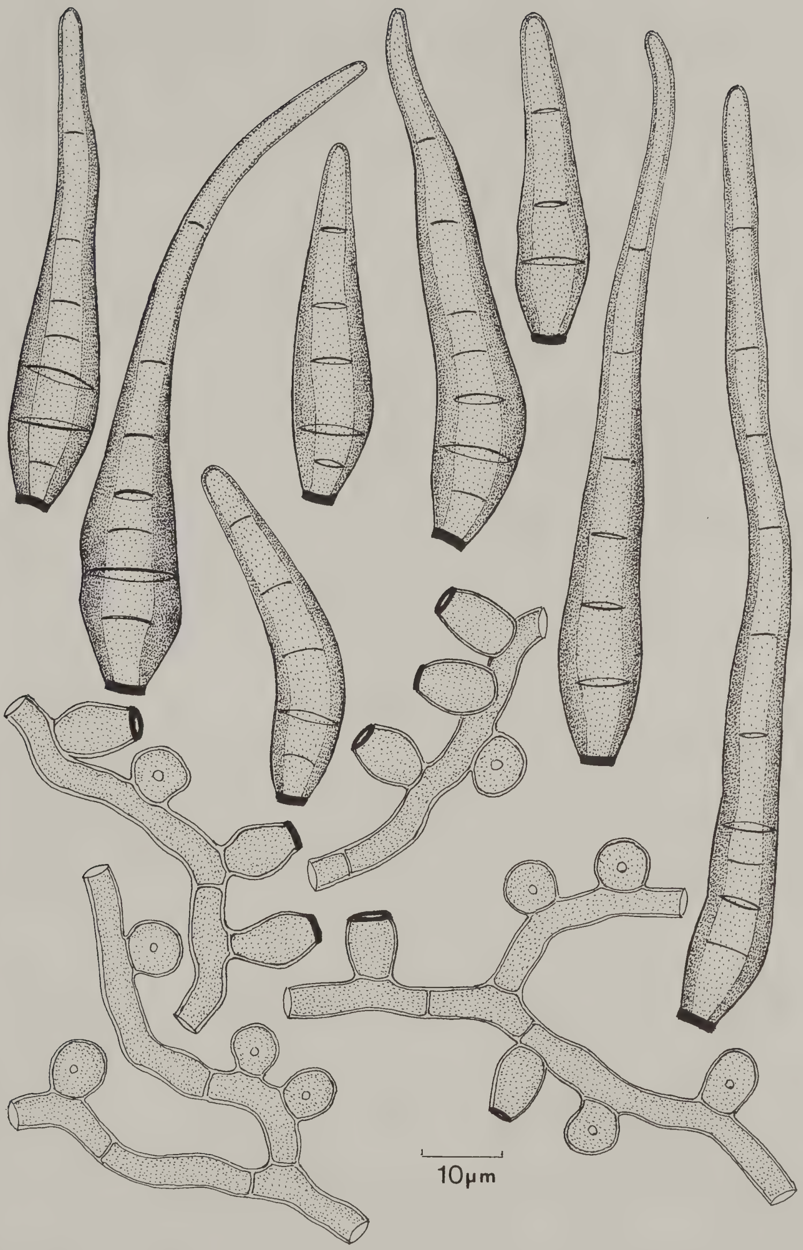


FIGURE 3. *Tretospora himalayana*. Mycelium, hyphopodia, conidiogenous cells and conidia.

10-13.5 X 3-8µm. Conidiogenous cells integrated, terminal, enteroblastic, monotretic, each comprising an entire conidiophore, with a black apical rim. Conidia solitary, arising singly through a pore at the apex of each conidiogenous cell, dry, straight or somewhat curved or gently undulate where long, simple, mostly broadly obclavate, rostrate, brown to dark brown, slightly paler distally, smooth, 3 to 12-pseudoseptate, base conicotruncate and bearing a dark hilum, apex obtuse to subacute, 55-184 X 10-16µm.

On leaves of *Daphne* sp. (Thymelaceae); Nepal.

Collection examined: on *Daphne* sp., Kathmandu Valley, Nepal, November 1993, Kamal, HCIO 41503, holotype; GPU Herb. No. 4006, AUA, isotypes.

A review of the genus *Tretospora* and a key to its five species were published by Khan *et al.* (1993). The type species, *T. negrii* M.B. Ellis, is the anamorph of *Balladynopsis negrii* (E. Castellani) M.B. Ellis and the genus also accommodates the *Tretospora* state of *Balladynopsis vanderystii* Hansf. [Dothidiales, Parodiopsidaceae]. These two taxa, as well as *T. indica* Narayan & Kamal and *T. shoreae* Khan & Kamal, are known to occur in India (Ellis, 1976; Khan *et al.*, 1993; Narayan and Kamal, 1986). *Tretospora himalayana*, the sixth species to be described, most closely resembles the anamorph of *B. vanderystii* but is distinguishable from that entity by the dimensions of its conidia. Although there is some size overlap between the two taxa, the conidia of *T. himalayana* are often appreciably longer and broader in relation to their length. The arrangement and size of the hyphopodia are also somewhat different in the two species.

ACKNOWLEDGEMENT

The authors appreciate the opportunity afforded to them by Dr. Kamal, Department of Botany, University of Gorakhpur, for study of some of the collections made by him during tenure of an INSA (India) Visiting Fellowship to RONAST (Nepal). The cooperation of the host institution, Tribhuvan University, Kathmandu, Nepal, is also acknowledged. A presubmission review of the manuscript was provided by Dr. Roger D. Goos, Department of Botany, University of Rhode Island, for which we are very grateful.

LITERATURE CITED

BUDATHOKI, U., R.K. VERMA and KAMAL. 1989. New species of *Phaeoramularia, Pseudocercospora* and *Stenella* from Nepal. *Indian Phytopathol.* 41:53-60.

DEIGHTON, F.C. 1971. Brown leaf-mould caused by *Stenella canavaliae* (H. & P. Syd.) comb. nov. *Trans. Br. mycol. Soc.* 56:411-418.

DAVID, J.C. 1991. *Parastenella*, a new generic name for *Heterosporium magnoliae*. *Mycol. Res.* 95:123-128.

ELLIS, M.B. 1971. Dematiaceous Hyphomycetes. CMI, Kew, England, 608 pp.

ELLIS, M.B. 1976. More Dematiaceous Hyphomycetes. CMI, Kew, England, 507 pp.

HUGUENIN, B. 1966. Micromycetes du Pacifique Sud. (Troisieme contribution) Dematiees de Nouvelle Caledonie. *Bull. trimest. Soc. mycol. Fr.* 81:686-698.

KHAN, M.K., U. BUDATHOKI and KAMAL. 1991. New foliicolous Hyphomycetes from Kathmandu valley, Nepal. *Indian Phytopathol.* 44:21-29.

KHAN, M.K., KAMAL and G. MORGAN-JONES. 1993. Notes on Hyphomycetes LXIII. Novel species of *Fuligomyces* and *Tretospora* from India, with comments on the genera. *Mycotaxon* 49:477-485.

KHAN, M.K., KAMAL and G. MORGAN-JONES. 1995. Notes on Hyphomycetes LXIV. New species of *Mycovellosiella*, *Phaeoisariopsis*, *Sirosporium* and *Stenella* from India. *Mycotaxon* 54:27-36.

MORGAN-JONES, G. 1980. Notes on Hyphomycetes. XXXV. *Stenellopsis* gen. nov. *Mycotaxon* 10:405-408.

NARAYAN, P. and KAMAL. 1986. New foliicolous hyphomycetes from India. *Can. J. Bot.* 64:201-207.

SINGH, S.M. 1979. A new species of *Stenellopsis*. *Curr. Sci.* 48:912-913.

SINGH, S.K., R.K. CHAUDHARY and G. MORGAN-JONES. 1995. Notes on Hyphomycetes. LXVII. Three new species of *Phaeoramularia* from Nepal. *Mycotaxon* 54:57-66.

SRIVASTAVA, K., A.K. SRIVASTAVA and KAMAL. 1993. *Stenellopsis xeromphigena* sp. nov. from north eastern Uttar Pradesh. *Indian Phytopathol.* 46:243-244.

VERMA R.K. and KAMAL. 1986. *Paraaoria himalayana* gen. et sp. nov. A foliicolous coelomycete from Nepal. *Trans. Br. mycol. Soc.* 87:645-647.

VERMA, R.K., R. CHAND and KAMAL. 1990. Two new species of *Uncinula* from Nepal. *Mycol. Res.* 94:128-130.

MYCOTAXON

Volume LVII, pp. 211-225 January-March 1996

LICHENOSTIGMA ELONGATA SPEC. NOV. (DOTHIDEALES), A LICHENICOLOUS ASCOMYCETE ON *LOBOTHALLIA* AND *ASPICILIA* SPECIES.

P. Navarro-Rosinés (1) and J. Hafellner (2)

(1) Departament de Biologia Vegetal, Facultat de Biologia, Universitat de Barcelona, Diagonal 645, E-08028 Barcelona, Spain.
(2) Institut für Botanik, Karl-Franzens-Universität, Holteigasse 6, A-8010 Graz, Austria.

Abstract.- The lichenicolous fungus *Lichenostigma elongata* Nav.-Ros. et Haf. spec. nova (Dothideales, Lichenotheliaceae) is described as new. This species lives parasitically on the thalli and apothecia of different species of *Lobothallia* and *Aspicilia*. *L. elongata* is distinguished from *L. maureri* Haf. and *L. rugosa* Thor, the only two species of the genus previously described, in the oblong-elongated shape of the ascocarps and the broader ascospores. For *Lichenostigma* species with elongate ascomata and superficial strands of hyphae the subgenus *Lichenogramma* Nav.-Ros. & Haf. is described.

Resumen.- Se describe *Lichenostigma elongata* Nav.-Ros. et Haf. spec. nova. (Dothideales, Lichenotheliaceae), un hongo liquenícola que se desarrolla sobre talos y apotecios de diferentes especies de *Lobothallia* y de *Aspicilia*. *L. elongata* se diferencia de *L. maureri* Haf. y de *L. rugosa* Thor, las dos especies del género anteriormente conocidas, por la forma oblongo-alargada de los ascocarpos y por la mayor anchura de las esporas. Se propone el subgénero *Lichenogramma* Nav.-Ros. & Haf. para las especies de *Lichenostigma* provistas de ascomas alargados y con agrupaciones de hifas superficiales.

Introduction

The genus *Lichenostigma* Haf. includes lichenicolous ascomycetes which are mainly characterized by the following characters: The ascocarps contain bitunicate asci developing in a paraplectenchymatous tissue, no interascal filaments are formed; the asci are broadly saccate and contain normally 8 one-septate ascospores; in early stages of development the ascospores are sourrounded by a gelatinous perispore which condenses in a dark outer wall layer when mature (Hafellner 1982).

Until now only two species were known. *Lichenostigma maureri* Haf. (type species) is a weak superficial parasite of various species of *Usnea* and *Pseudevernia furfuracea*; *Lichenostigma rugosa* Thor grows on several species of *Diploschistes* (Thor 1985, Lumbsch 1989).

As a result of recent studies on mediterranean lichens, which included the investigation of many specimens of *Lobothallia* and *Aspicilia*, a further species of *Lichenostigma* was recognized, which subsequently proved to be widely distributed and overlooked. This new species is described below.

Material and Methods

For this study air dried herbarium specimens of the species cited below have been used. External morphology was studied with a dissecting microscope (WILD M3, 6.4x-40x), and anatomical studies of the thallus and the ascomata were carried out using a light microscope (REICHERT POLYVAR, 40x-1000x). Sectioning was performed with a freezing microtome (LEITZ, Schnittdicke 12-15 µm) but squash preparations were also used especially for observations of the asci. Preparations were mounted in water. Where necessary, staining was performed by pretreatment with lactic acid-cotton blue (MERCK 13741). Sections and squash preparations were not pretreated with KOH. Measurements refer to dimensions in ordinary water.

Besides the specimens (paratypes) of *Lichenostigma elongata* cited below the following specimens have been used for comparision.

Lichenostigma maureri.- **Austria:** Steiermark, Grazer Bergland, auf Fichten an der Nordseite des Schöckels, 1400 m, on *Usnea* spec., 24.XI.1974, leg. W. Maurer (GZU, holotype). - **Georgia**: Caucasus Magnus, regio montis ignivomi Elbrus, in valle torrentis Adylsu prope pagum Elbrus, loco Dzan-Tugan dicto, 1800-2000 m, on *Usnea* spec., 23.VI.1980, leg. A. Vezda, Lich. sel. exs. 1949 (BCC-lich, GZU).

Lichenostigma rugosa.- **Spain**: Cataluña, prov. de Girona, Alt Empordà, el Port de la Selva: els Pins, carretera de Cadaqués, U.T.M. 31TEG1784-1785, 100 m, on *Diploschistes diacapsis*, 8.III.1992, leg. A. Gómez-Bolea, X. Llimona, P. Navarro-Rosinés & C. Roux (BCC-lich). - Murcia, Alhama: Sierra de Carrascoy, Rambla de Roy, U.T.M. 30SXG5189, 900 m, on *Diploschistes actinostomus* var. *farinosus*, leg. J. M. Egea, D. Le Coeur, P. Navarro-Rosinés & C. Roux, 30.IX.1992 (BCC-lich). - **Libya**: Cyrenaica, 25 km SSE of Al Abyar, 62 km SSW of Al Marj, open desert plane with scattered *Retama raetam* shrubs, on *Diploschistes steppicus*, 26.III.1983, leg. G. Thor no. 3458 (Hafellner, isotype).

Lichenothelia scopularia.- **Austria**: Steiermark, Stubalpe, südseitige Schrofen am Ostrücken des Speikkogel, um 1750 m, 2.VI.1974, leg. J. Poelt no. 12781, confirm. D. Hawksworth (GZU). - **Czechia**: Bohemia centr., in rupe schistosa prope pag. Pikovice ad fluv. Ságava, ca. 200 m, leg. J. Suza, Lich. Bohemoslovakiae 278 sub *Microthelia aterrima* (BCC-lich). - Bohemia occid., Trebic, ad fluv. Jihlavka prope pag. Dalesice in rupe granulitica, ca. 320 m, leg. J. Suza, Lich. Bohemoslovakiae 241 sub *Microthelia aterrima* (BCC- lich).

Results

Lichenostigma elongata Nav.-Ros. et Haf. sp. nov.

Fungus lichenicolus. Pseudothecia superficialia, elongata, ad filamenta composita superficialia connecta, dispersa vel aggregata, nigra, minuta, ad 40-70-(100) µm crassa, stromatoidea, cellulis subglobosis composita. Filamenta interascalia nulla. Asci subglobosi demum saccati, bitunicati, pariete endoascali apicaliter incrassato, octospori, iodo non reagentes. Ascosporae 10-13 x 6-8.5 µm, uniseptatae, primum hyalinae halonataeque, mox fuscae, verruculosae. Omnes partes iodo non reagentes.

Differt a *Lichenostigma maureri* et a *L. rugosa* pseudothecia elongata, praesentia filamentis compositis superficialibus et sporis latioribus.

Typus.- Hispania, Catalonia, Prov. Tarragona, Ribera d'Ebre, Móra d'Ebre: loco dicto els Xarcums, U.T.M. 31TBF9454, 300 m, ad saxa calcarea supra thallum *Lobothalliae radiosae* crescens, 14.XI.1987, leg. M. Giralt et P. Navarro-Rosinés (BCC- lich, holotype; GZU, IMI, M, MARSSJ, UPS, isotypes).

Etymology: The epitheton elongata refers to the shape of the ascomata. The female sex is used because the second part of the generic name is derived from the greek -stigme, f. meaning point, dot (Brown 1956: 513).

Description:

Vegetative hyphae: partly superficial, forming black strands on the surface of the host (Figs. 1-2), simple or with few ramifications, about 200-500 µm long and of rather variable thickness (8-20 µm), additional vegetative hyphae penetrating into the host, hyaline, frequently such hyphae attach the stromatic ascomata to the cortical layer of the host (Fig. 5B).

Ascomata black, superficial, elongate, recognizable as intercalar thickenings of hyphal strands (Figs. 1-2), somewhat convex, 50-200 µm long and 30-60 µm wide; internal structure paraplectenchymatic, stromatic, hyphal cells almost spherical, 4-5 µm in diam., external cells with dark brown walls, wall pigment granular, internal cells hyaline, vertical thickness about 40-70(-100) µm (Figs. 3, 5 A-D).

Interascal filaments lacking, interascal space filled with spherical cells.

Asci: few (1-5) per section, developing close to the upper surface, fissitunicate, subglobose to broadly ovate, 20-25 x 15-18 µm, 8-spored (Fig. 4 F).

Ascospores: one-septate, broadly obovate, uncoloured and provided with distinct gelatinous perispore when young, becoming brown at maturity, with finely granular surface at this stage, slightly constricted at the septum, (9)-10-13 x 6-8,5 µm (Figs. 4 A-E, 5 E-F).

Chemical reactions: Centrum J(Lugol) negative, KJ(Lugol) negative. Ascus wall J(Lugol) negative, KJ(Lugol) negative, no fine structures visible in Methyleneblue. Spore wall and perispore J(Lugol) negative, Methyleneblue negative, brown condensed perispore becoming decolorized in C and reforming the hyaline perispore.

Life form: lichenicolous, slightly parasitic. The parasitic behaviour is most obvious when the fungus grows on the apothecia of the host, where it eventually causes the formation of deep cracks.

Anamorph: unknown.

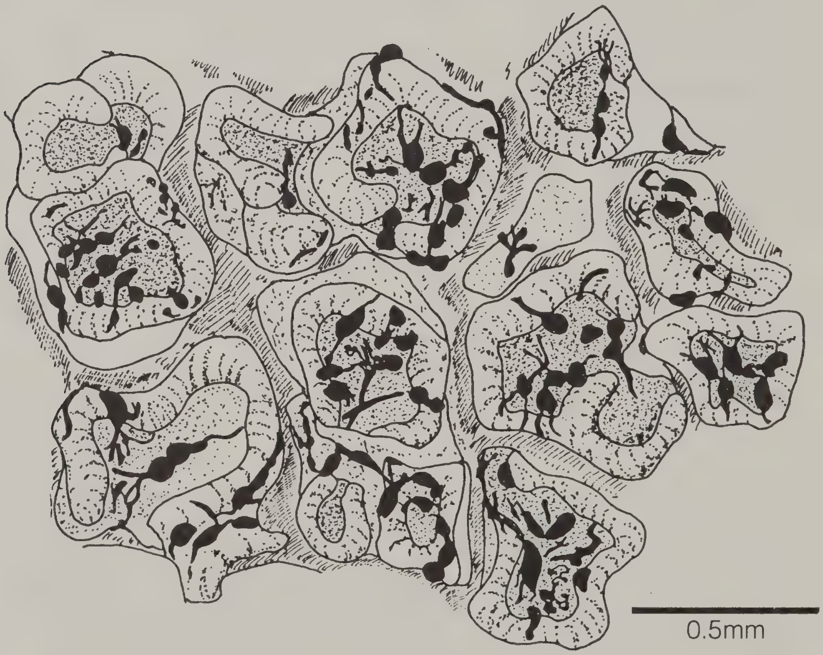


Fig. 1.- *Lichenostigma elongata* on *Lobothallia radiosa*. Habitus on thallus and apothecia (type).

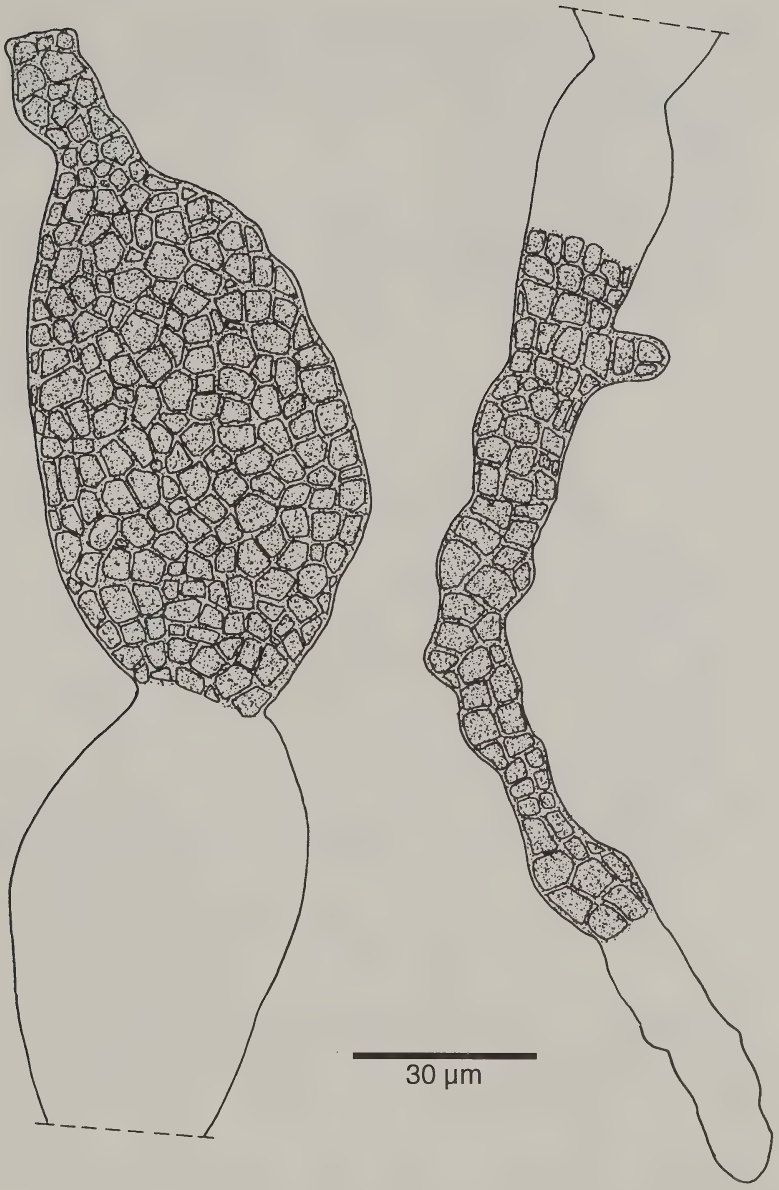


Fig. 2.- *Lichenostigma elongata* on *Aspicilia calcarea*. Surface view of ascocarps and hyphal strands, cellular structure only partly indicated (Tivissa, Ermita de St. Blai, Spain).

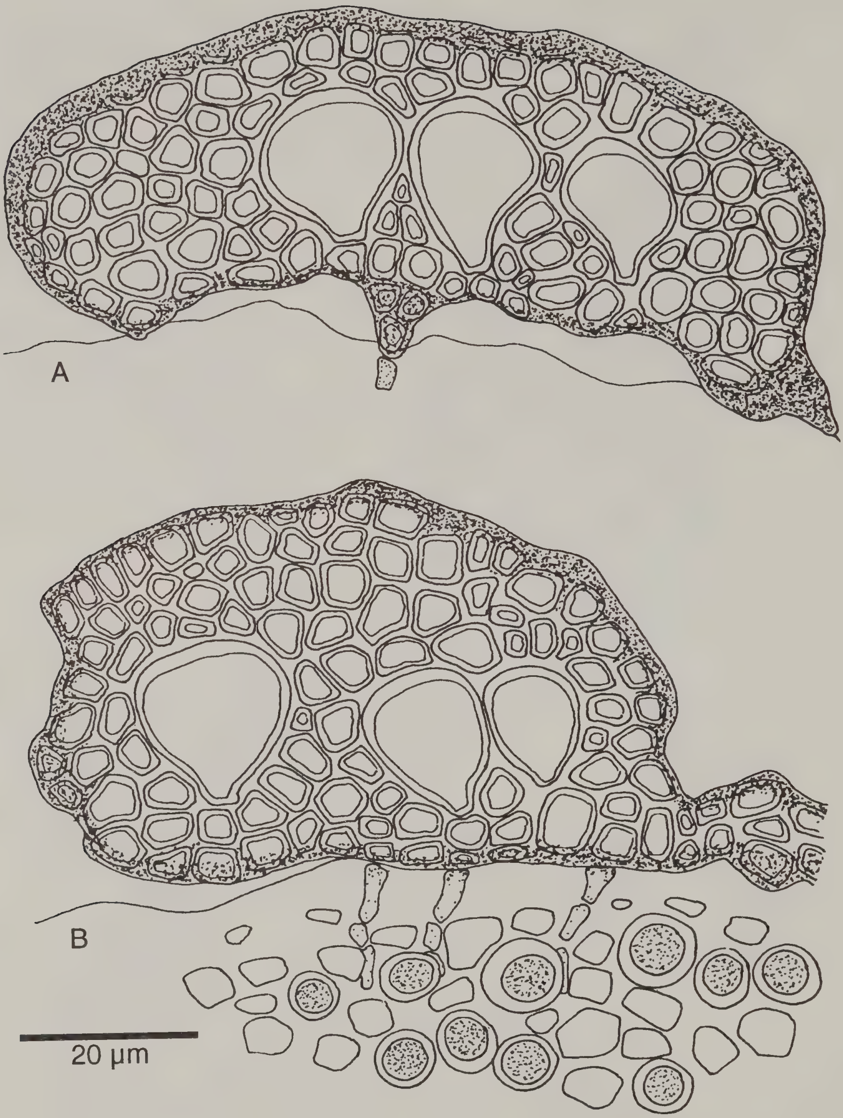


Fig. 3.- *Lichenostigma elongata*. Sections of ascomata. A- on *Lobothallia radiosa*, Dobrogea (Romania). B- on *Aspicilia calcarea*, Tivissa, Ermita de St. Blai (Spain).

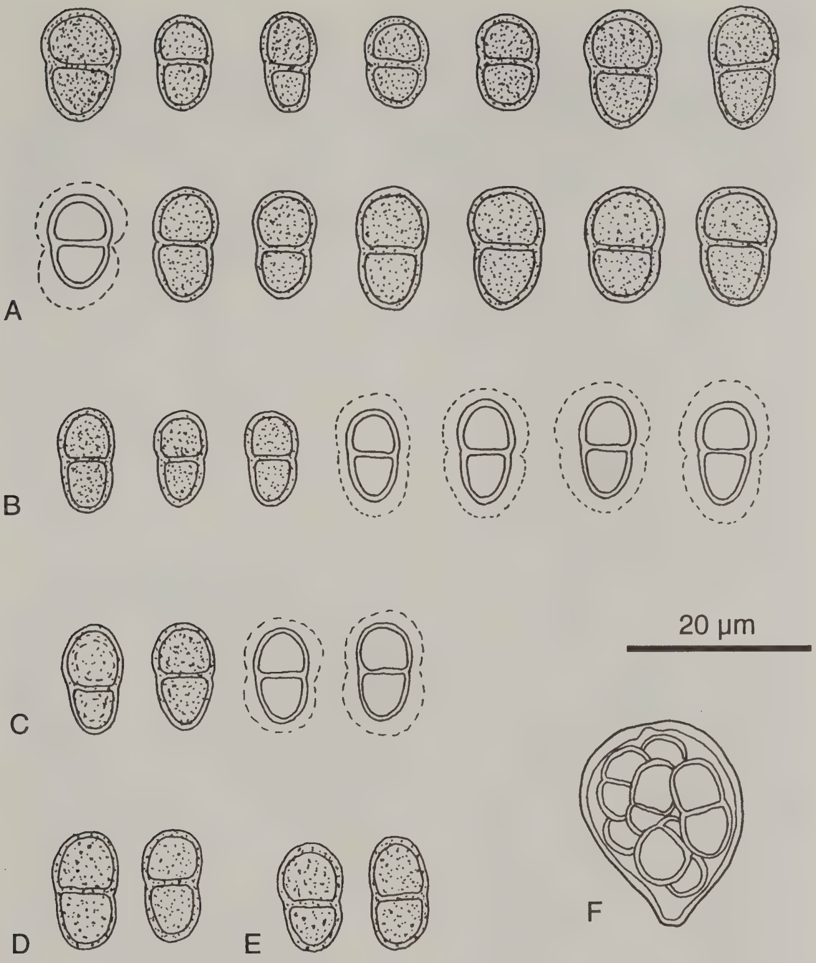
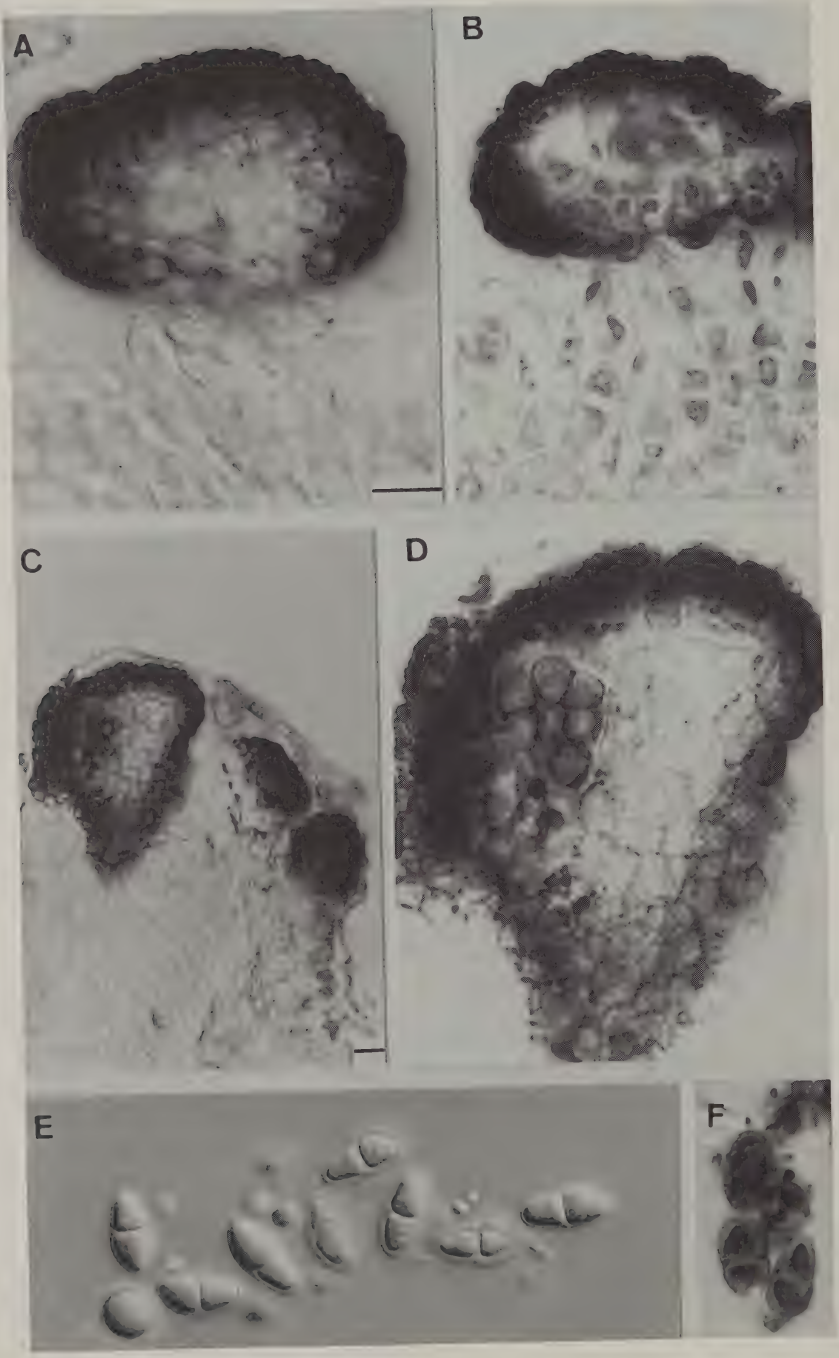


Fig. 4.- *Lichenostigma elongata.* A-E.- ascospores, A- Truel (Gard, France), B- Móra d'Ebre (type), C- Hans-sur-Lesse (Namur, Belgium), D- Krakowsko-Czestochowska (Polonia), E- (Rochers de Chooz (Ardennes, France). F.- ascus (type).

Fig. 5.- *Lichenostigma elongata.* A- section of young ascocarp (interference contrast). B- section of ascocarp (lactic acid - cotton blue). C,D- section of mature ascocarp developing in pycnidium of the host. E- young ascospores (interference contrast). F- mature ascospores (lactic acid - cotton blue). (All figures from type, scale = 10 µm, for Fig. A, B, D, E, F on A). →


A
B
C
D
E
F

Hosts: *Lobothallia radiosa* (1) (host of type), *L. praeradiosa* (2), *?L. alphoplaca* (Gerber 1931, see below), *Aspicilia calcarea* (3), *A. cernohorskiana* (4), *A. cheresina* (5), *A. contorta* subspec. *contorta* (6), *A. c.* subspec. *hoffmanniana* (7), *?A. gibbosa* (Faurel & Schotter 1958, see below), *Aspicilia* spec. (8). It is also reported on *A. caesiocinerea* by van den Boom & al. (1994).

Affinities: *L. elongata* differs from other species of the genus in the elongate shape of the ascocarps, the presence of superficial hyphal strands and somewhat broader ascospores. The internal structure of the ascomata of all known *Lichenostigma* species is very similar and it is mainly characterized by the bitunicate asci separated by globular stromatic cells, i.e. interascal filaments are not differentiated. In this respect they are similar to some species included originally in *Lichenothelia* (Henssen 1987). It is possible that the *Lichenothelia* species with a pseudoparenchymatous hamathecium should be transferred to *Lichenostigma* subgen. *Lichenogramma* (see below[1]).

Lichenostigma elongata has been observed previously by Gerber (1931: 480-483, as "Epiphyt auf *Placodium alphoplacum*"), and Roux (1978: 184, as "Champignon stérile 1"), both describing the external morphology of the ascocarps and the hyphal strands and the texture of sterile ascocarps. The record of "*Stigonema minutissimum* f. *lichenicolum*" mentioned by Faurel & Schotter (1958: 73, 79) probably refers to the same species.

Habitat: *Lichenostigma elongata* is very frequent in epilithic communities of the Aspicilion calcareae alliance, mainly in the Placocarpetum schaereri (=Dermatocarpetum monstrosi) and Aspicilietum calcareae associations, in which the fungus is regarded as a highly characteristic species (Roux 1978: 124, Tab. XXXV, 132, Tab. XLV, sub champignon stérile 1, p.p.). These communities occur on exposed calcareous rocks under microclimatical conditions with marked fluctuations in temperature and moisture. *L. elongata* is also found in heminitrophytic and xerophytic communities on siliceous rocks, where one of the main hosts, *Lobothallia radiosa*, is a frequent species.

---

[1] As the species described above does not fit exactly the description of *Lichenostigma* a new subgenus is introduced.

***Lichenostigma* Haf. (1982) subgenus *Lichenogramma* Nav.-Ros. & Haf. subgen. nov.**

Differt a subgenere typico ascomatis elongatis et praesentia filamentorum compositorum superficialium.

Holotypus subgeneris: *Lichenostigma elongata* Nav.-Ros. & Haf.

Species of the subgenus *Lichenogramma* differ from those of subgen. *Lichenostigma* in the elongate shape of the ascomata which are connected to superficial strands composed of several short-celled hyphae. The internal structure of the ascocarps is the same as in species of *Lichenostigma* subgen. *Lichenostigma*.

Distribution: Based on our present knowledge, in Europe *L. elongata* has a central european-mediterranean distribution linked with the principal distribution of the hosts. It is also found in the mediterranean and more or less arid parts of Africa, Asia and North America. Records outside of the Holarktis are rare. One record from Australia however shows that the overall distribution may be much wider.

Specimens seen:

The numbers in brackets before the date refer to the hosts listed above. Collections preserved under the host are indicated by an asterisk after the number which refers to the host. The names of the authors are abbreviated by their initials.

Europe: **Austria**: Burgenland: Südburgenland, Güssing, Burg Güssing, Innenhof, (1*), 1.V.1979, leg. J. Poelt (GZU). - Ibid., am Fuß des Berges, SE-seitig, 221 m, (1*), 18.VI.1978, leg. M. Friedl (GZU). - Südburgenland, Hannersdorf E von Großpetersdorf, am Fuß des kleinen Hügels S der Kirche, ca. 270 m, MTB 8764/3, niedere S-exponierte Schieferschrofen, (1), 7.I.1991, leg. J. H. no. 26482 & W. Maurer (GZU). - Niederösterreich: Thermenalpen, Frauenstein bei Mödling, S-seitige, flache Trockenhänge mit niederen Dolomitfelsen über der Klause, 300-320 m, (1*), 14.IX.1984, leg. H. Mayrhofer no. 4332 & J. Poelt (GZU). - Bad Deutsch Altenburg, Pfaffenberg SE des Ortes, SW-exponierte von Kalkfelsen durchsetzte Trockenrasen nahe dem Steinbruch, 200-250 m, (1*), 23.VIII.1983, leg. H. Mayrhofer no. 3548 (GZU). - Tirol: Samnaun-Gruppe, Umgebung von Tösens im oberen Inntal, Hänge N vom Ort unweit der Kapelle St. Georg, ca. 1050-1100 m, MTB 8929, SE-exponierte Kalkschieferschrofen im lückigen Föhrenwald, (2), 6.IX.1991, leg. J. H. no. 30360 (Hafellner). - Osttirol, Virgental, Obermauern, S-Hänge der Burg, ca. 1400 m, MTB 8940/4, niedere Kieselkalkschrofen, (2), 1.IX.1988, leg. J. H. no. 23603 (GZU). - **Belgium**: Huccorgne, versant droit du Fond de Roua, près du châteaux de Famelette. Rochers calc. ensoleilles (dans le Xerobrometum), (1*), 16.XI.1963, leg. J. Lambinon (LG). - Namur, Hans-sur-Lesse, Belvédère, 230 m, crête rocheuse calcaire, U.T.M. FR5555, (1*), 24.IX.1982, leg. P. Malaise (LG) . - Olloy, au dessus du vieux chemin de Dourbes, bloc horizontal dans une pelouse, assoc. ± ornithocoproph., (1*), 1.XII.1962, leg. J. Lambinon (LG). - **France**: Alpes-Maritimes, Gorges de Saorge au débouché de la Bendola, 360 m, petit muret en blocs de calcaire gréseux, (1*), 24.V.1968, leg. J. Lambinon (LG). - Alpes-Maritimes, Peille, Route de l'Escarène, au SW et à env. 3 km du village, petit calcaire siliceux, presque au ras du sol, alt. 600 m, (1*), 24.IV.1968, leg. J. Lambinon (LG). - Ardennes, Rochers d'Aviette (comm. Rancennes), rochers schisto-grèseux du Couvinien supér., ± éclairés, à exp. SW dans le haut de l'escarpement, (1*), 30.V.1970, leg. J. Lambinon (LG). - Ardennes, Rochers de

Chooz, au-dessus du hameau de Petit-Chooz, rochers schisto-grèseux ± calcareux éodévoniens sur la crête ensoleillée, (1*), 31.V.1970, leg. J. Lambinon (LG). - Basses Alpes, au NE de Thoard, à proximité du sommet du pic de Siron, 1650 m alt., calcaires liasiques exposes, presque au ras du sol, (3*), 25.VI.1965, leg. G. Clauzade (MARSSJ). - Corse, Haute Corse, désert des Agriates, Meeresstrand im Mündungsbereich des Flusses Ostriconi, 10 m, (1*), VIII.1990, leg. M. Matzer no. 1243 (GZU). - Gard, au S. de Truel, (3), 29.I.1976, leg. C. Roux (MARSSJ). - Seine-et-Marme, Saint-Mammès, alt. 50-70 m, dans un talus calcaire exp. SSW, sur rocher calcaire, (1), 17.III.1991, leg. P. Diederich et C. Roux (Diederich). - Vaucluse, Gargas, 350 m, grès siliceux et ferrugineux ensoleillés, versant S de la colline du fort, près du sommet, (1*), 23.IV.1965, leg. J. Lambinon (LG). - Vaucluse, Joucàs, (1*, 3*), 12.VIII.1969, leg. X. Llimona (BCC-lich). - Ibid., (3*), 19.VIII.1969, leg. X. Llimona (BCC-lich. 178). - Vaucluse, Saignon, Plateau des Claparèdes, près de Colombier, 600 m alt., pierre calcaire (molasse burdigalienne) sur le sol en bordure d'un chemin, (3*), 29.XI.1963, leg. G. Clauzade (MARSSJ). - Vaucluse, Saignon, Rochers de l'Oratoire, molasse burdigalienne, exposés W, (3*), 12.VI.1949, leg. G. Clauzade (MARSSJ). - **Germany**: Thüringen, Kyffhäuser, Naturschutzgebiet Ochsenburg, Südabdachung des Kyffhäusers bei Bad Frankenhausen, 200-240 m, Gips, (2*), 7.IX.1979, leg. R. Schubert & J. Poelt (GZU). - **Greece**: Insel Kreta: Prov. Chania, Straße nach Omalos etwa 500 m SW von Lacki, kleine, anstehende Felsgruppen aus weichen, schieferigen Gesteinen, NE-exponierter Hang, um 500 m, (1), 17.VIII.1976, leg. H. Mayrhofer (GZU). - Prov. Rethimnon, an der Straße zwischen den Orten Nithavris und Fourfouras, etwa 1 km S von Kouroutes, einzelne Felsen zwischen Äckern, 500 m, (1*), 19.VIII.1976, leg. H. Mayrhofer (GZU). - **Italy**: Emilia-Romagna: Prov. Parma, nördlicher Apennin, an der Straße über den Pso. della Cisa, Mte. Prinzera am N Ortsende von Boschi di Bardone, ca. 650 m, Serpentinit, SW-exponierte Abbrüche, (1), 29.X.1978, leg. J. H. no. 23604 (Hafellner). - Ibid., leg. H. Mayrhofer (GZU). - Friuli- Venezia Giulia: Prov. Trieste, Carso Triestino, Val Rosandra SE von Triest, ca. 1 km E von Basovizza, ca. 300 m, auf Kalkblöcken am Rand der Hochfläche, (1), 30.VII.1993, leg. J. H. no. 23651 & P. L. Nimis (GZU). - Liguria: Prov. Savona, NW oberhalb Laigueglia, ca. 50 m, Flyschmergelblöcke, (1), 27.IV.1965, leg. M. Steiner (GZU). - Prov. Savona, Passo di S. Giacomo, bei Alassio, ca. 770 m, an mergeligem Gestein, (1*), 3.V.1965, leg. M. Steiner (GZU). - Sicilia: Prov. Palermo, Le Madonie, Piano di Battaglia SE über Collesano, beweideter, von Kalkblöcken durchsetzter Hang, 1620-1640 m, (1*), 31.V.1988, leg. J. Poelt (GZU). - W of Messina, Madonie, 18 km S of Cefalù, 3 km S of Isnello, Torre Montaspro, slope with steep limestone autcrops, coord. 14.00E-38.00N, alt. 1000 m, (1), 4.VIII.1990, leg. P. v. d. Boom no. 10481a (P. v. d. Boom). - Südtirol: Vinschgau, Laaser Leiten NW von Laas und Eyrs, ca. 900 m, S-exponierte Trockenrasen mit kleinen Silikatschrofen, (2), 5.IX.1992, leg. J. H. no. 30600 (Hafellner). - Vinschgau, am Eingang in das Schlandrauntal bei Schlanders, auf Gneis, (1*), 15.VII.1966, leg. J. Poelt no. 3435

(GZU). - **Polonia**: Wyzyna Krakowsko-Czestochowska, Jura poludniowa, Dolina Kluczwody okolo 300 m, Na skalach wapienia jurajs kiego, (1*), 6.IV.1955, leg. J. Nowak (LG). - Kraków-Wielun Upland, Przeginia Duchowna, distr. Kraków, 280 m, on horizontal surfaces of sunny limestone outcrops above stream, (1*), 30.VI.1970, leg. J. Nowak (GZU). - **Romania**: Dobrogea, Distr. Constanta, in valle rivi Tirgusor, inter vicos Gura Dobrogei et Tirgursor, alt. 50 m, ad saxa calcarea, (1*), 10.VIII.1974, leg. A. Vèzda (LG, sub A. Vèzda: Lichenes selecti exsiccati 1637: Aspicilia calcarea var. dobrogensis). - Ibid., (3*), (BCC-lich). - **Serbia**: an der Straße von Titovo Uzice nach Visegrad, 7 km NE von Mokra Gora, auf Serpentinit, (1*), 14.VII.1974, leg. J. H. no. 1194 (GZU) . - Ibid., (1), leg. J. H. no. 23605 (GZU). - **Spain**: Andalucía: Prov. Almería, Sierra de los Filabres, Calar Alto, SW vom Observatorio Astronómico, N von Gérgal, 1900 m, S-exponierte Granatglimmerschieferblöcke, (1*), 21.IX.1980, leg. J. H. no. 9638 (GZU). - Aragón: Prov. Zaragoza, Escatrón: Monte Mocatero, U.T.M. 30TYL27-YL37, 190 m, (3), 17.X.1991, leg. P. N.-R. (BCC-lich). - Prov. Zaragoza, am Nordufer des Embalse de Mequinenza N von Caspe, 200 m, Triften mit Kalksandsteinblöcken, (1*), 25.V.1983, leg. H. Mayrhofer no. 3724 (GZU). - Cataluña: Prov. Barcelona, Baix Llobregat, Begues: Pla de Campgras, U.T.M. 31TDF0971, 530 m, (3), 22.VII.1990, leg. A. Canals (BCC-lich). - Prov. Barcelona, Baix Llobregat, Cervelló: urbanització Selva Negra, U.T.M. 31TDF18, arenisques del Buntsandstein, 100-200 m, (1), 13.XI.1971, leg. X. Llimona (BCC-lich). - Prov. Girona, Alt Empordà, Roses: Cap Norfeu, U.T.M. 31TEG2176, 100-150 m, (3), 8.III.1992, leg. A. Canals, X. Llimona, P. N.-R. & C. Roux (BCC-lich). - Prov. Lleida, Segarra, Sanaüja: prop del poble, U.T.M. 31TCG54-CG63, 500 m, (5*, 7*), 13.II.1983, leg. P. N.-R. (BCC-lich).- Ibid., (1), 29.XII.1982, leg. P. N.-R. (BCC-lich). - Ibid., (1), 28.II.1992, leg. P. N.-R. (BCC-lich). - Prov. Tarragona: Baix Camp, Colldejou: entre el Portell del Llam i la Mola, U.T.M. 31TCF2152, 700-900 m, (3), 9.XII.1988 leg. A. Canals, M. Giralt, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Baix Ebre, Benifallet, camí de l'ermita de St. Onofre, prop del Balneari del Cardó (Serra del Cardó), U.T.M. 31TBF9636, 550 m, (3), 14.XI.1987, leg. M. Giralt & P. N.-R. (BCC-lich). - Baix Ebre, Benifallet, camí vell del Balneari del Cardó (Serra del Cardó), U.T.M. 31TBF9636, 450 m, (3), 6.XI.1988, leg. M. Giralt, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Baix Ebre, Roquetes, Barranc del Lloret (Serra dels Ports), U.T.M. 31TBF7617, 300 - 400 m, (3), 5.VII.1987, leg. M. Boqueras, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Baix Ebre, Tivenys, Barranc del Xato, U.T.M. 31TBF9130-9230, 100-150 m, (6, 7), 5.XI.1988, leg. M. Giralt, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Sierra de Prades, NW-geneigte Hänge SW ober dem Monasterio de Poblet, an der Straße nach Prades, ca. 500 m, Quercetum ilicis mit Schieferblöcken, (1*), 23.V.1983, leg. J. H. no. 17502 (GZU). - Montsianès, La Sénia, entre les Vallcaneres Altes i la Mola dels Conills (Serra dels Ports), U.T.M. 31TBF7015-7115, 1200 m, (3), 14.II.1987, leg. M. Boqueras, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Priorat, La Torre de Fontaubella, Collet de la Plana d'en Cervera, U.T.M. 31TCF2154-

2253, 500-550 m, (1, 7), 13.XI.1987, leg. M. Giralt & P. N.-R., (BCC-lich). - Ribera d'Ebre, Móra d'Ebre, els Xarcums, U.T.M. 31TBF9454-9554, 300 m, (1, 3, 4), 14.XI.1987, leg. M. Giralt & P. N.-R. (BCC-lich). - Ribera d'Ebre, Rasquera, prop del poble, U.T.M. 31TBF9641, 200-300 m, (3, 7), 14.XI.1987 leg. M. Giralt & P. N.-R. (BCC-lich). - Ribera d'Ebre, Tivissa, Ermita de St. Blai, U.T.M. 31TCF0844-0845, 400 m, (1, 3, 7), 2.VI.1988, leg. M. Giralt, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Ribera d'Ebre, Tivissa, Barranc del Montalt, prop de la Serra d'Almós, U.T.M. 31TCF1348-1448, 300-400 m, (3), 2.VI.1988, leg. M. Giralt, A. Gómez-Bolea & P. N.-R. (BCC-lich). - Murcia: Alhama, Sierra de Carrascoy, Rambla de Roy, U.T.M. 30SXG5189, 900 m, (1), 30.IX.1992, leg. J. M. Egea, D. Le Coeur, P. N.-R. & C. Roux, (BCC-lich). - Sierra de Almenara, Alto de Palomera, 400 m, (1*), 28.XII.1976, leg. J. M. Egea (GZU).

Africa: **Tunisia**: Steinige Hänge am Djebel Ġoraa, an der Straße Thibar-Teboursouk, um 450 m, (8), 12.IV.1968, leg. J. Poelt (GZU).

Asia: **Cyprus**: Distr. Larnaca, Kloster Stavrovouni W Larnaca, ca. 600 m, Felsabbrüche unter dem Kloster, (1*), 17.IV.1987, leg. M. & H. Mayrhofer no. 7194 (GZU). - **Jordania**: As Salt, Wadi Sháib, on calcareous rocks, (1*), 24.IV.1983, leg. El-Oqlah (GZU). - **Mongolia**: Ömnögobi Aimak: Bajandalai Somon, Dsuramtai, (8), 30.VI.1988, leg. S. Huneck MVR 88-257 (GZU). - Dund-Saichan, 2600 m, (1), 27.VI.1988, leg. U. Cogt no. 6350 (GZU). - **Syria**: Nordsyrien, Quala'at, Sam'an, Zitadelle bei Bab el Hauwa, (3*), 1989, leg. H. Pölzl (GZU).

Australia: New South Wales, Yass, road to Careys Cave, 1 km NNE of Wee Yasper, ca. 400 m, limestone, (1*), 10.VIII.1988, leg. H. Mayrhofer no. 8018, J. A. Elix, J. Johnston & H. Streimann (GZU).

North America: **U.S.A.**: Arizona: Canyon De Chelly near Chinle, ca. 2000 m, (8), 1987, leg. H. Pölzl (GZU). - Maricopa Co., McDowell Mountains Regional Park, Ft. McDowell Quadrangle, 2200 ft., E-facing slope, upper Sonoran desert scrub, (8), 10.I.1976, leg. T. H. Nash & M. A. Lane no. 1899a (GZU). - Colorado, Rocky Mountains, Cefferson Co., sandstone outcrops of the Morrison Formation near mouth of Mt. Vernon Canyon, near the Interstate Hwy, 1950 m, (1), 4.IX.1977, leg. R. Anderson & J. Poelt (GZU).

Discussion

Henssen (in Eriksson and Hawksworth 1986: 137) proposed the family Lichenotheliaceae which is regarded as belonging to Dothideales s. ampl. The family comprises the genera *Lichenothelia* D. Hawksw. and *Lichenostigma* Haf. Initially Hawksworth (1981) included in *Lichenothelia* only those species with filiform interascal filaments. Henssen (loc. cit.) extended the concept of *Lichenothelia* to species with a pseudoparenchymatous hamathecium and she proposed to distinguish the two genera mainly on the arrangement of the asci. In *Lichenothelia* the asci are produced in a hymenium-like layer, in *Lichenostigma* asci are scattered within the pseudoparenchyma of the stromatic ascoma. However, *Lichenostigma* was not mentioned when Henssen (1987) described 18 new species of *Lichenothelia*, although similarities in ascoma construction between several of these newly described species and *Lichenostigma* are striking.

Besides the frequent occurrence of thallus-borne macroconidia, an amyloid centrum seems to be characteristic for *Lichenothelia* species. Their ascomata are eithe applanate to pulvinate provided with a pseudoparenchymatous hamathecium or they are apothecioid with filamentous hamathecium. Among *Lichenothelia* species with apothecioid ascocarps an amyloid centrum is rare (or absent?, amyloidy is absent in at least the type species *Lichenothelia scopularia*), although an amyloid centrum is regarded as typical for the genus by Eriksson and Hawksworth (1988: 79).

In *Lichenostigma* the amyloidy of the centrum is so far unknown. *Phaeosporobolus* is probably the anamorph genus of *Lichenostigma* subgen. *Lichenostigma* (Hawksworth & Hafellner 1986: 528). No anamorph has been found in *Lichenostigma elongata* (subgen. *Lichenogramma*). As ascocarps are regularly formed, dispersal by fragmented hyphal strands or side branches seems unlikely but can not be excluded .

Acknowledgements

The authors are grateful to C. Roux (Marseille) and E. Sérusiaux (Liége) for allowing us to study material in their care (MARSSJ, LG), to P. Diederich (Luxembourg) and P. v. d. Boom (Son) for the loan of specimens collected by them, to X. Llimona for comments on the manuscript and to D. L. Hawksworth and J. David (both Egham) for constructive criticism and linguistic improvement of the text.

The first author gratefully acknowledges financial support by DGICYT of Ministerio de Educación y Ciencia (Spain), project PR89-0518.

References

Brown, R. W. (1956).- Composition of scientific words. Washington, Smithsonian Institution Press.

Clauzade, G., P. Diedrich et C. Roux (1989).- Nelikenigintaj fungoj likenlogaj. Ilustrita determinlibro.- *Bull. Soc. Linn. Provence*, Núm. spécial 1: 1-142.

Eriksson, O. E. et D. L. Hawksworth (1986).- Notes on ascomycete systematics. Nos 1-224.- *Syst. Ascomycetum* 5(1): 113-174.

Eriksson, O. E. et D. L. Hawksworth (1988).- Notes on ascomycete systematics -

Nos 552-732.- *Syst. Ascomycetum* 7(1): 59-101.

Faurel, L. et G. Schotter (1958).- Lichens. In: P. Quézel, Mission botanique au Tibesti, p. 67-79, tab. I. Algier.

Gerber, K. (1931).- Die epiphytische Verbreitung von "Flechtenparasiten".- *Arch. Protistenk.* 74: 471-489.

Hafellner, J. (1982).- Studien über lichenicole Pilze und Flechten II. *Lichenostigma maureri* gen. et sp. nov., ein in den Ostalpen häufiger lichenicoler Pilz (Ascomycetes, Arthoniales).- *Herzogia* 6: 299-308.

Hawksworth, D. L. (1981).- *Lichenothelia* a new genus for the *Microthelia aterrima* group.- *Lichenologist* 13: 141-153.

Hawksworth, D. L. et J. Hafellner (1986).- *Phaeosporobolus usneae*, a new and widespread lichenicolous deuteromycete.- *Nova Hedwigia* 43: 525-530.

Henssen, A. (1987).- *Lichenothelia*, a genus of microfungi on rocks. In: Progress and Problems in Lichenology in the Eighties.- *Biblioth. Lichenol.* 25: 257-293.

Lumbsch, H. T. (1989).- Die holarktischen Vertreter der Flechtengattung *Diploschistes* (Thelotremataceae).- *J. Hattori Bot. Lab.* 66: 133-196.

Roux, C. (1978).- Complément a l'étude écologique et phytosociologique des peuplements lichéniques saxicoles-calcicoles du SE de la France.- *Bull. Mus. Hist. Nat. Marseille* 38: 65-186.

Thor, G. (1985).- A new species of *Lichenostigma*, a lichenicolous ascomycete.- *Lichenologist* 17: 269-272.

Van den Boom, P., M. Brand, P. Diederich, A. Aptroot et E. Sérusiaux (1994).- Report of a lichenological field meeting in Luxembourg.- *Bull. Soc. Nat. Luxemb.* 95: 145-176.

MYCOTAXON

Volume LVII, pp. 227-232 January-March 1996

COUMARINS DISTRIBUTION IN FOUR TRUFFLE SPECIES*.

BRUNO TIRILLINI - ANNA MARIA STOPPINI
Institute of Botany, University of Urbino,
Bramante, 28, (61029) Urbino (Italy)

ABSTRACT

Scopoletin, angelicin and bergaptene were found in the *Tuber aestivum* Vitt., *T. borchii* Vitt., and *T. melanosporum* Vitt. ascomata. No coumarins were found in *T. magnatum* Pico. The coumarin pattern shown by the ascomata of these four *Tuber* spp. would be a chemiotaxonomic marker for differentiated *T. magnatum* to *T. borchii* an *aestivum* to *T. melanosporum*.

Key words: truffle, ascoma, coumarins

Studies on the genetic variability of geographic populations of *Tuber* spp. have demonstrated that *T. magnatum* Pico and *T. melanosporum* Vitt. are each homogeneous genetic populations, whereas *T. borchii* Vitt. (2 genetically different clones) and *T. aestivum* Vitt. (12 genetically different clones) are heterogeneous (Lanfranco et al. **1993**; Bullini et al. **1994**).

Little is known about the secondary products of *Tuber* spp., and no investigations have been reported on coumarins. These compounds are natural products present in numerous plants (Murray et al. **1982**). The coumarins are found on the fruit and seed surfaces, in the internal tissues, as well as inside the fruit and the embryo (Cappelletti et al. **1984**; Innocenti et al.**1984**). The presence of coumarins on the external surface could be related to their protective role against bacteria and fungi (Fowlks et al. **1958**; Towers **1987**), while the internal localization may be explained by their germination-inhibiting action (Baskin et al. **1967**; Friedman et al. **1982**), which could also be important in the auto-inhibition of germination. Coumarins were also found in different tissues of the leaf and the stem with small concentrations in the epidermis, and greater concentrations in the parenchyma cells (Zobel & Brown **1988**).

The aim of the present research was to investigate the coumarin content in *T. aestivum* Vitt., *T. borchii* Vitt., *T. magnatum* Pico and *T. melanosporum* Vitt. ascomata. These are the most important edible and commercial species of the genus *Tuber* .

METHODS

Fungus material

Ascomata of the four *Tuber* spp. (24 ascomata of each) *Tuber aestivum* Vitt., *T. borchii* Vitt., *T. magnatum* Pico and *T. melanosporum* Vitt. were collected in Italy during different months, in 1992, 1993 and 1994; and were identified on the basis of ascoma morphology and spore shape (Costantin & Dufour **1926**; Chevalier et al. **1988**; Granetti et al. **1988**).

Photographic documentation (*Tuber aestivum* Vitt.: TAE 30, *T. borchii* Vitt.: TBO 30, *T. magnatum* Pico: TMA 30 and *T. melanosporum* Vitt.: TME 30) has been filed at the Botany Institute Herbarium of the University of Urbino.

Extraction and isolation of coumarins.

Fresh ascomata were extracted in a Soxlet extractor with methanol in a 1/25 w/v ratio.The vacuum-concentrated extracts was chromatographed on preparative thin layer chromatography (TLC) Si gel (1.0 mm layer thickness). The TLC was developed in two steps: in the first step, the eluent was toluene: diethyl ether and acetic acid (50: 45 and 5) and the second step, the eluent was chloroform and methanol (80 and 20). The coumarins isolated on Si gel layer were removed and these compounds were extracted with methanol. The prepurified methanol extract was chromatographed in a high performance liquid chromatograph (HPLC) apparatus (column: C18 spherisorb (0.8 x 30 cm) - detection set at 310 nm - eluent: isocratic for 20 min (water: methanol 68: 32) and then linear gradient (100% methanol in 30 min). The compounds eluted from HPLC were subjected to electron impact mass spectroscopy (EIMS) (70 eV) in a QMD 1000 quadrupole mass spectrometer (Fisons - Carlo Erba Instruments) equipped with a direct insertion probe and operating at 200°C. The qualitative and quantitative determinations of the coumarins were carried out by direct comparison with authentic samples.

Statistical analyses

The data matrices were analyzed by cluster analysis; these data analyses were then converted to Mahalanobis distances and clustered using simple linkage procedures. This statistical analysis is particularly useful when a group discrimination must be made between very similar values. The degree of separation of a centroid to the total fused centroid is evaluated by means of the ratio between the distance at which this centroid was formed (di) and the distance at which the centroid contained all of the values (da) (Steiner **1974**; Jouden **1975**; Sadocchi **1981**; Wilkinson **1989**) .

RESULTS AND DISCUSSION

The ascomata of *T. aestivum* contained 0.8 - 2.3 g/g dry weight

Table 1 - Coumarin content in *Tuber* spp. (mean value)

Tuber spp.	scopoletin g/g dry weight	angelicin g/g dry weight	bergaptene g/g dry weight
T. aestivum			
TAE1	1.8	34.3	11.3
TAE2	0.9	45.3	17.4
TAE3	2.3	83.8	18.4
TAE4	0.9	58.6	16.5
TAE5	1.2	71.5	9.4
TAE6	0.8	58.1	10.3
TAE7	1.2	43.9	8.6
TAE8	1.0	57.6	14.3
T. borchii			
TB1	0.0	12.8	3.0
TB2	0.0	14.3	10.4
TB3	0.0	12.3	3.5
TB4	1.4	10.8	6.4
TB5	0.0	9.2	5.0
TB6	0.0	8.5	4.1
TB7	0.0	9.4	5.3
TB8	0.0	9.8	7.4
T. melanosporum			
TME1	0.0	0.0	10.8
TME2	0.8	1.3	21.4
TME3	0.0	0.0	13.4
TME4	0.0	0.0	15.7
TME5	0.0	0.0	18.1
TME6	0.0	0.0	15.4
TME7	0.0	0.0	20.3
TME8	0.0	0.0	18.4

scopoletin, 34.3 - 83.8 g/g dry weight angelicin and 8.6 - 18.4 g/g dry weight bergaptene (Tab.1). The ascomata of *T. borchii* contained 8.5 - 14.3 g/g dry weight angelicin, and 3.0 - 10.4 g/g dry weight bergaptene, and only one contained scopoletin (1.4 g/g dry weight) (Tab. 1). The ascomata of *T. melanosporum* contained 10.8 - 21.4 g/g dry weight bergaptene and only one ascoma contained scopoletin (0.8 g/g dry weight) and angelicin (1.3 g/g dry weight) (Tab. 1). The ascomata of *T. magnatum* did not contain any coumarins.

The angelicin and bergaptene contents in the ascomata of *T. aestivum*, *T. borchii* and *T. melanosporum* were subjected to cluster analysis. The 24 concentration values of angelicin were divided into 8 groups, each made up of the 3 most similar values and the mean for each groups was determined. The same was done for the 24 concentration values of bergaptene. The 24 concentration mean values for the 2 coumarins were the input data matrix. The results of clustering this series of data allowed eight groups to be distinguished at a 0.14 di/da ratio (ratio that gathers all the in the range x±σ values (x is the arithmetical mean and σ the population standard deviation for angelicin or bergaptene coumarin concentration values in each *Tuber* spp.)) (Fig.1).

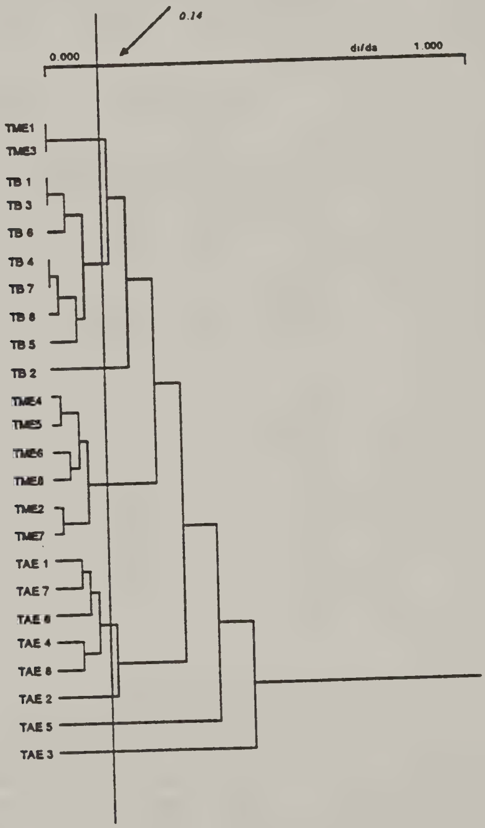


Figure 1. Dendrogram showing relationships among *Tuber borchii*, *T. melanosporum* and *T. aestivum*.

The TME values divided into two groups; one group was made up of TME1 and TME3, while the other was composed of TM2, TM4, TM5, TM6, TM7, and TM8, the first group is more similar to the TB group than to the other TME groups. The TB values divided into two groups: one formed by seven values and the other had only one value. The TAE values divided into four groups; these were formed by five, one, one and one value each.

The absence of coumarins in *T. magnatum* ascomata could be related to the genetic homogeneity of this population. The statistical division of the *T. borchii* ascoma population into 2 groups is in accordance with the two genetic clones distinguished in the population. The division of the *T. melanosporum* ascoma population into two group is in contrast with the genetic homogeneity of this population. The high genetic heterogeneity found in the *T. aestivum* population (12 clones) is only partially confirmed by their coumarin pattern (4 groups).

The coumarin pattern shown by the ascomata of these four *Tuber* spp. could be a chemiotaxonomic marker to differentiate *T. magnatum* from the other three *Tuber* spp.. This is important with respect to *T. borchii* that is morphologically similar to the *T. magnatum*. A good distinction can also be made between *T. aestivum* and *T. melanosporum* which are also morphologically similar.

Regarding the homogeneity of each species, if we refer to the genetic criteria, there is agreement between *T. magnatum* and *T. borchii*; whereas in *T. melanosporum* the cluster analysis shows more groups than there are genetic clones.

At present it is not known if there is a correlation between the cluster groups and the genetic clones namely if the TB2 cluster group corresponds to one of the two genetic clones of *T. borchii* and the other TB cluster group to the other genetic clones. In order to clarify this, the secondary metabolites of each genetic group should be studied.

ACKNOWLEDGMENTS

I extend special thanks to Dr. J. Boise for her suggestions and to Profs. B. Granetti and J. trappe for reviewing the manuscript.

BIBLIOGRAPHY

BASKIN, J.M., LUDLOW, C.J., HARRIS, T.M. and F. T. WOLF. 1967. Psoralen, an inhibitor in the seeds of *Psoralea subacaulis* (Leguminosae). *Phytochem.* **6**: 1209-1213.

BULLINI, L., BIOCCA, E., CHEVALIER, G., DUPRE', C., FERRARA, A.M PALENZONA, M., SALICANDRO, P. and S. URBANELLI. 1994. Struttura clonale di alcune specie del genere *Tuber*. *Giorn. Bot. Ital.* **128**: 51.

CAPPELLETTI, E.M., INNOCENTI, G. and G. CAPORALE. 1984. Furocoumarins localization in the fruit and seed of *Psoralea coryfolia*. *Plant. Med. Phytother.* **18**:181-190.

CHEVALIER, G., RIOUSSET, G. and C. DUPRE'. 1988.Taxonomie des truffes europiennes. In *Atti del secondo congresso internazionale sul tartufo. Spoleto 24-27 Novembre*, pp. 37-44.

COSTANTIN, M.J. and M.L. DUFOUR. 1926. *Nuovelle Flore des Champignons*. Librairie Generale de l'Enseignement, Paris.

FOWLKS, W.L., GRIFFITH, D.G. and E.L. OGINSKY. 1958. Photosensitization of bacteria by furanocoumarins and related compounds. *Nature* **181**: 571-572.

FRIEDMAN, J., RUSHKIN, E. and G.R. WALLER. 1982. Highly potent germination inhibitors in aqueous eluate of fruits of his hop's weed (*Amni majus* L.) and avoidance of autoinhibition. *J. Chem. Ecol.* **8**: 55-65.

GRANETTI, B., MINCIGRUCCI, G. and E. BRICCHI. 1988. Analisi biometrica e morfologica delle ascospore di alcune specie del genere *Tuber*. In *Atti del secondo congresso internazionale sul Tartufo. Spoleto 24-27 Novembre* pp. 59-100.

INNOCENTI, G., CAPPELLETTI, E.M. and G. CAPORALE. 1984. Morphological and chemical characteristic of some Australian *Psoralea* species. *Inter. J. Crude Drug Res.* **22**: 97-109.

JOUDEN, W.J. 1975. *Statistical techniques for collaborative tests*, A.O.A.C. Ed., Arlington. pp. 21-26.

LANFRANCO, L., WYSS, P., MARZACHI, C. and P. BONFANTE. 1993. DNA probes for identification of the ectomycorrhizal fungus *Tuber magnatum* Pico *FEMS Microbiology Letters* **114**: 245-252.

MURRAY, R.D.H., MENDEZ, J. and S.A. BROWN (Eds). 1982. *The natural coumarins: occurrence, chemistry and biochemistry*. J Wiley and Sons.

TOWERS, G.H.N. 1987. Fungicidal activity of naturally occurring photosensitizers.*American Chemical Society Symposium.* Series 339: 231-240.

SADOCCHI, S.1981. *Manuale di analisi statistica multivariata,* Franco Angeli Ed., Milano (Italy) pp. 204-236.

STEINER, E.H. 1974. *Planning and analysis of results of collaborative tests,* A.O.A.C. ED., Arlington pp.72-82.

WILKINSON, L. 1989. *Systat: the system for statistics,* Systa Inc.Evanston, Ill.

ZOBEL, A.M. and S.A. BROWN. 1988. Furanocoumarins on plant surfaces. In: *Proceedings XIV International Conference of Group Polyphenols. Brock University, St. Catharines, Ontario, Canada.* p. 65.

MYCOTAXON

Volume LVII, pp. 233-321 January-March 1996

CERCOSPOROID FUNGI FROM SOUTH AFRICA

P.W. CROUS
Department of Plant Pathology, University of Stellenbosch,
7600 Stellenbosch, South Africa

U. BRAUN
Martin-Luther-Universität, FB. Biologie, Institut für Geobotanik
und Botanischer Garten, Neuwerk 21, D-06099 Halle (Saale),
Germany

ABSTRACT

All known records of South African cercosporoid fungi are listed. A total of 159 species are included, of which four are newly described, 11 proposed as new combinations in *Cercostigmina, Passalora*, *Pseudocercospora*, and *Stigmina*, and eight are new records. New species include *Stigmina cocculi* on *Cocculus hirsutus*, *S. knoxdaviesii* on *Sclerocarya caffra*, *Pseudocercospora doidgei* on *Trema guineensis*, and *P. fici-sycamorusii* on *Ficus sycamorus*. Species treated that do not occur in South Africa are *Stenella psychotriae* comb. nov. from *Psychotria* sp. in Brazil, *Pseudocercospora paraguayensis* comb. nov. from *Eucalyptus* sp. in Paraguay, and *Pseudocercospora rogersoniana* sp. nov. from *Phlox longifolia* in Utah, USA.

HOST INDEX

Acacia
Camptomeris verruculosa (Syd.) Bessey **152**
Acalypha
Pseudocercospora transvaalensis (Syd.) Deighton **148**
Ageratum
Mycovellosiella perfoliati (Ellis & Everh.) Muntañola **108**
Ajuga
Ramularia ajugae (Niessl.) Sacc. **2**
Allamanda
Pseudocercospora byliana (H. Syd.) Yen **18**
Amaranthus
Cercospora brachiata Ellis & Everh. **15**
Annona
Stigmina oblecta (Syd.) Crous & U. Braun **97**
Pseudocercospora scitula (H. Syd.) Deighton **142**
Apium
Cercospora apii Fresen. **3**
Ramularia heraclei (Oudem.) Sacc. **71**
Pseudocercosporella pastinacae (P. Karst.) U. Braun **107**
Arachis
Cercospora arachidicola Hori **4**
Passalora personata (Berk. & Curt.) Shakil A. Khan & M. Kamal **110**
Argyrolobium
Pseudocercospora argyrolobii (Chupp & Doidge) Deighton **5**
Asparagus
Cercospora asparagi Sacc. **6**
Asterina on *Ilex* (hyperparasite)
Eriocercospora balladynae (Hansf.) Deighton **8**
Bauhinia
Pseudocercospora bauhiniae (H. & P. Syd.) Deighton **9**
Berkheya
Mycovellosiella berkheyae (Syd.) U. Braun & Crous **10**
Mycovellosiella berkheyae-maritimae Crous & U. Braun **11**
Beta
Cercospora beticola Sacc. **12**
Bidens
Cercospora bidentis Tharp **13**
Brachiaria
Phaeoramularia fusimaculans (G.F. Atk.) Liu & Guo **58**
Brassica
Cercospora brassicola P. Henn. **17**
Pseudocercosporella capsellae (Ellis & Everh.) Deighton **21**
Carya
Cercospora caryae Chupp & Doidge **25**
Sirosporium diffusum (Heald & Wolf) Deighton **44**

Cassia

Phaeoramularia occidentalis (Cooke) Deighton **98**

Cassinopsis

Cercospora cassinopsidis G. Winter **26**

Celastrus

Stigmina celastri (Kalchbr.) M.B. Ellis **27**

Ceratotheca

Cercospora sesami Zimm. **144**

Chenopodium

Passalora dubia (Riess) Braun **51**

Cichorium

Cercospora cichorii Davis **28**

Cissampelos

Pseudocercospora pareirae (Speg.) Crous & U. Braun **105**

Cissus

Pseudocercospora riachueli (Speg.) Deighton **132**

Clerodendrum

Pseudocercospora clerodendri (Miyake) Deighton **31**

Clutia

Pseudocercospora clutiicola Crous & U. Braun **32**

Cocculus

Stigmina cocculi Crous & U. Braun **33**

Coffea

Cercospora coffeicola Berkeley & Cooke **34**

Commelyna

Cercospora commelynae Kalchbr. & Cooke **35**

Corchorus

Cercospora corchori Sawada **37**

Crotalaria

Cercospora demetrioniana G. Winter **42**

Curtisea

Pseudocercospora curtisiae (Chupp & Doidge) Crous & U. Braun **39**

Cymbopogon

Cercospora sorghi Ellis & Everh. **145**

Cynanchum

Pseudocercospora punctiformis Goh & W.H. Hsieh **127**

Cyperus

Cercospora caricis Oudem. **22**

Dactylis

Passalora graminis (Fuckel) Höhn. **61**

Daucus

Cercospora carotae (Pass.) Kazn. & Siemaszko **23**

Dichondra

Mycovellosiella dichondrae Crous & U. Braun **43**

Dioscorea

Distocercospora africana Crous & U. Braun **1**

Diospyros

Pseudocercospora diospyri-lycioides Crous & U. Braun **45**

Dissotis

Pseudocercospora dissotidis (Chupp & Doidge) Crous & U. Braun **47**

Dolichos
Cercospora canescens Ellis & Martin **20**
Dombeya
Mycovellosiella dombeyae Crous & U. Braun **49**
Dovyalis
Pseudocercospora dovyalidis (Chupp & Doidge) Deighton **50**
Echium
Cercospora echii G. Winter **52**
Eichhornia
Cercospora piaropi Tharp **113**
Ekebergia
Cercosporella ekebergiae Syd. **54**
Emex
Cercospora tripolitana Sacc. & Trotter **149**
Erica
Stigmina caffra (Wakefield) M.B. Ellis **19**
Eucalyptus
Pseudocercospora eucalyptorum Crous, M.J. Wingf., Marasas & B. Sutton **55**
Stigmina robbenensis Crous, C.L. Lennox & B. Sutton **137**
Eugenia
Pseudocercospora punctata (Wakefield) B. Sutton **126**
Ficus
Passalora bolleana (Thuem.) U. Braun **14**
Pseudocercospora fici-sycamorusii Crous & U. Braun **56**
Flemingia
Pseudocercospora melaena (Syd.) Deighton **92**
Fragaria
Ramularia grevilleana (Tul. & C. Tul.) Joerst. **63**
Glycine
Cercospora kikuchii T. Matsumoto & Tomoyasu **79**
Gomphrena
Cercospora pretoriensis Chupp & Doidge **118**
Gossypium
Cercospora gossypina Cooke **59**
Ramulariopsis gossypii (Speg.) U. Braun **60**
Grewia
Ramularia grewiae-occidentalis Crous & U. Braun **64**
Haemanthus
Cercospora haemanthi Kalchbr. **66**
Hakea
Cercostigmina protearum var. *hakeae* U. Braun & Crous **121a**
Halleria
Pseudocercospora halleriae (Chupp & Doidge) Deighton **67**
Helianthus
Cercospora helianthi Ellis & Everh. **69**
Hibiscus
Cercospora malayensis Stev. & Solh. **89**
Hypoestes
Cercosporella hypoestis Hansf. **74**

Ipomoea
Pseudocercospora timorensis (Cooke) Deighton **147**
Jussiaea
Pseudocercospora jussiaeae (G.F. Atk.) Deighton **76**
Kalanchoe
Cercospora pseudokalanchoes Crous & U. Braun **123**
Kiggelaria
Pseudocercospora kiggelariae (Syd.) Crous & U. Braun **78**
Lactuca
Cercospora longissima (Cugini in Herb.) Sacc. **86**
Lantana
Pseudocercospora formosana (Yamamoto) Deighton **57**
Mycovellosiella lantaniphila Crous, U. Braun & M.J. Morris **82**
Leonotis
Cercospora leonotidis Cooke **84**
Leucadendron
Cercostigmina protearum var. *leucadendri* (Cooke) U. Braun & Crous **121c**
Leucospermum
Cercostigmina protearum (Cooke) U. Braun & Crous var. *protearum* **121b**
Limonium
Cercospora insulana Sacc. **75**
Lupinus
Cercospora lupinicola Lieneman **87**
Maesa
Stenella maesae Crous & U. Braun **88**
Manihot
Passalora henningsii (Allesch.) Castañeda & U. Braun **70**
Maytenus
Phaeoisariopsis melanochaeta (Ellis & Everh.) Deighton **93**
Medicago
Cladophialophora kellermanianum (Marasas & Bredell) U. Braun & U. Feiler **77**
Cercospora medicaginis Ellis & Everh. **91**
Momordica
Cercospora citrullina Cooke **30**
Musa
Pseudocercospora musae (Zimm.) Deighton **94**
Myrtus
Pseudocercospora myrticola (Speg.) Deighton **95**
Nicotiana
Cercospora nicotianae Ellis & Everh. **96**
Olinia
Pseudocercospora oliniae (Verwoerd & Dippenaar) Crous & U. Braun **99**
Oryza
Cercospora oryzae Miyake **101**
Pachycarpus
Passalora pachycarpi (Chupp & Doidge) Crous & U. Braun **102**
Pastinaca
Passalora pastinacae (Sacc.) U. Braun **106**

Persea
Pseudocercospora purpurea (Cooke)Deighton 128
Petunia
Cercospora petuniae (Saito) Muller & Chupp 111
Phaseolus
Phaeoisariopsis griseola (Sacc.) Ferr. 65
Pseudocercospora cruenta (Sacc.) Deighton 38
Phlox
Passalora omphacodes (Ellis & Holway) Crous & U. Braun 100
Phoenix
Stigmina palmivora (Sacc.) Hughes 104
Physalis
Cercospora physalidis Ellis 112
Pinus
Pseudocercospora pini-densiflorae (Hori & Nambu) Deighton 114
Pistia
Cercospora pistiae Nag Raj, Govindu & Thirumalachar 115
Plantago
Cercospora plantaginis Sacc. 116
Polygonum
Passalora avicularis (G. Winter) Crous & Morris 7
Pseudocercospora persicariae (Yamam.) Deighton 109
Pouzolzia
Pseudocercospora pouzolziae (Syd.) Guo & Liu 117
Pretrea
Cercospora sesami Zimm. 144
Primula
Ramularia primulae Thüm. 119
Printzia
Mycovellosiella laxa (Kalchbr. & Cooke) Deighton 83
Priva
Mycovellosiella delicatissima (Kalchbr. & Cooke) U. Braun 41
Protea
Batcheloromyces proteae Marasas, van Wyk & Knox-Davies 120
Prunus
Stigmina carpophila (Lév.) M.B. Ellis 24
Passalora circumscissa (Sacc.) U. Braun 29
Passalora rubro-tincta (Ellis & Everh.) U. Braun 140
Pseudarthria
Pseudocercospora pseudarthriae (Petch) Deighton 122
Psychotria
Pseudocercospora psychotriicola (Chupp & Doidge) Crous & U. Braun 124
Raphanus
Pseudocercosporella capsellae (Ellis & Everh.) Deighton 21
Cercospora cruciferarum Ellis & Everh. 36
Rauvolfia
Cercostigmina liebenbergii (Syd). Crous & U. Braun 85

Reseda
Cercospora resedae Fuckel 129
Rheum
Cercospora rhapontici Tehon & Daniels 130
Rhododendron
Pseudocercospora handelii (Bubák) Deighton 68
Rhoicissus
Pseudocercospora rhoicissi (Syd. & P. Syd.) Deighton 131
Rhus
Stigmina curvispora Crous & U. Braun 40
Stigmina pulviniformis (Syd.) Hughes 125
Stigmina rhois Crous & U. Braun 133
Richardia
Ramularia richardiae Kalchbr. 134
Ricinus
Cercospora ricinella Sacc. & Berl. 136
Rosa
Passalora rosicola (Pass.) U. Braun 138
Rubus
Cercospora heteromalla Syd. 73
Pseudocercospora rubi (Sacc.) Deighton 139
Rumex
Ramularia rumicis Kalchbr. & Cooke 141
Saccharum
Mycovellosiella koepkei (Krüger) Deighton 81
Mycovellosiella vaginae (Krüger) Deighton 150
Sclerocarya
Stigmina knoxdaviesii Crous & U. Braun 80
Scolopia
Paracercospora scolopiae Crous & U. Braun 143
Smilax
Pseudocercospora pallidissima (Chupp) Deighton 103
Solanum
Mycovellosiella brachycarpa (H. Syd.) Deighton 16
Paracercospora egenula (Syd.) Deighton 53
Statice
Cercospora insulana Sacc. 75
Stizolobium
Pseudocercospora stizolobii (H. & P. Syd.) Deighton 146
Syzygium
Pseudocercospora marasasii Crous & M.J. Wingf. 90
Trema
Pseudocercospora doidgei Crous & U. Braun 48
Triticum
Ramulispora herpotrichoides (Fron) von Arx 72
Cladophialophora kellermanianum (Marasas & Bredell) U. Braun & U. Feiler 77
Verbena
Passalora verbeniphila (Speg.) Crous & U. Braun 151
Vigna
Pseudocercospora cruenta (Sacc.) Deighton 38

Viola
Cercospora granuliformis Ellis & Holway **62**
Cercospora violae Sacc. **153**
Vitis
Phaeoramularia dissiliensis (Duby) Deighton **46**
Pseudocercospora vitis (Lév.) Speg. **154**
Withania
Pseudocercospora withaniae (H. & P. Syd.) Deighton **155**
Zantedeschia
Cercospora richardiicola G.F. Atk. **135**
Zea
Cercospora zeae-maydis Tehon & Daniels **156**
Zinnia
Cercospora zinniae Ellis & Martin **157**
Ramularia zinniae Crous & U. Braun **158**
Zizyphus
Pseudocercospora zizyphi (Petch) Crous & U. Braun **159**

GENERA TREATED

1. *Batcheloromyces*
2. *Camptomeris*
3. *Cercospora*
4. *Cercosporella*
5. *Cercostigmina*
6. *Cladophialophora*
7. *Distocercospora*
8. *Eriocercospora*
9. *Mycovellosiella*
10. *Paracercospora*
11. *Passalora*
12. *Phaeoisariopsis*
13. *Phaeoramularia*
14. *Pseudocercospora*
15. *Pseudocercosporella*
16. *Ramularia*
17. *Ramulariopsis*
18. *Ramulispora*
19. *Sirosporium*
20. *Stenella*
21. *Stigmina*

SYNOPTIC KEY TO GENERA TREATED

Habits
saprobic (isolated from seeds, straw, etc.) 6
hyperparasitic 8
phytoparasitic 1, 2, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

Mycelium
internal 2, 3, 4, 5, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21
external 8
internal and external 1, 4, 6, 9, 14, 15, 16, 18, 19, 20
Texture:
smooth 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21
roughened 1, 5, 19, 20, 21

Colour:
- hyaline 4, 9, 11, 14, 15, 16, 17, 18
- pigmented 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 19, 20, 21

Conidia

Hila (scars):
- thickened 2, 3, 4, 7, 8, 9, 11, 12, 13, 16, 17, 19, 20
- thickened at rim 10
- unthickened 1, 5, 6, 14, 15, 18, 21

Shape:
- acicular 3, 13, 14, 18
- obclavate 2, 3, 4, 5, 7, 9, 10, 11, 12, 14, 15, 19, 20, 21
- oblong, cylindrical, subcylindrical to vermiform 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20
- short, cylindrical, ellipsoidal, ovoid, subglobose 1, 6, 9, 11, 13, 16, 17, 19, 20, 21

Wall:
- smooth 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
- roughened 1, 2, 5, 7, 9, 12, 13, 14, 16, 19, 20, 21

Septation:
- (0-)1(-4)-septate 1, 2, 4, 6, 11, 16, 17, 20
- pluri-septate 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21

Type of septa:
- distoseptate 1, 2, 7, 21
- euseptate 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

Longitudinal and oblique septa
- present 19, 21
- absent 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20

Colour:
- hyaline 3, 4, 9, 11, 14, 15, 16, 17, 18
- pigmented 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 19, 20, 21

Conidial mass:
- slimy 18
- dry 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21

Lateral branches or secondary conidia
- common 18
- absent to rare 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21

Catenulation (conidial chains):
- present 1, 6, 9, 13, 16, 17, 20
- absent 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

Conidiogenous cells

Proliferation:

absent (monoblastic, determinate) 6, 15

sympodial 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

sympodial and percurrent 14

percurrent 1, 5, 21

Scars:

conspicuously thickened and darkened 2, 3, 9, 13, 16, 17, 19, 20

almost unthickened or slightly thickened, but darkened 7, 8, 9, 11, 12, 13

conspicuously thickened but not darkened 4

thickened along the rim 10

unthickened 1, 5, 6, 14, 15, 18, 21

Annellations:

dense, integrated 5, 14

irregular, verrucose 1, 21

absent 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20

Location:

integrated, terminal, intercalary and lateral 17

integrated terminal 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21

Conidiophores

Colour

hyaline 4, 15, 16, 17, 18

pigmented 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 19, 20, 21

Arrangement:

solitary on superficial hyphae 6, 8, 9, 14, 16, 17, 18, 20

fasciculate 3, 4, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21

sporodochial (large stromata, immersed to erumpent-superficial, with numerous short, dense conidiophores) 5, 14, 15, 21

fasciculate on superficial, inflated vesicles 2

synnematous 12

conidiophores arising from superficial hyphae, emerging through stomata, radiating, forming sporodochium-like plates 1

DICHOTOMOUS KEY TO GENERA TREATED

1. Conidiophores colourless **2**

1. Conidiophores pigmented **8**

2. Conidial scars conspicuous, thickened and/or darkened, refractive **3**

2. Conidial scars inconspicuous, neither thickened, nor darkened; conidia scolecosporous **7**

3. Conidia catenate **4**

3. Conidia solitary **6**

4. Conidial scars wide, thickened, not darkened, at most somewhat refractive; conidia broadly obclavate-subcylindric, septate, usually formed singly, occasionally in short secondary chains (formed after conidial secession) ***Cercosporella***

4. Conidial scars thickened and darkened, usually minute; conidia always catenate, often in branched chains, shape variable, but not obclavate **5**

5. Conidiophores fasciculate, erect, frequently branched from the base upwards; conidiogenous cells integrated, terminal and intercalary, lateral, small protuberances or branchlets ***Ramulariopsis***

5. Conidiophores simple, rarely branched; conidiogenous cells only terminal; mycelium internal, sometimes also external ***Ramularia***

6.(3) Conidia scolecosporous, acicular, subcylindric, obclavate, oblong, multiseptate; conidial scars wide, thickened, refractive, not darkened; mycelium internal, rarely external with solitary conidiophores ***Cercosporella***

6. Conidia non-scolecosporous, subglobose, ellipsoid-ovoid, subcylindrical, short, 0-1(-2)-septate; conidial scars thickened and darkened ***Ramularia***

7.(2) Parasitic on cereals and grasses (Poaceae), causing various symptoms; conidiophores short, narrow, simple, filiform; conidial scars inconspicuous; conidia long, narrow, simple or with lateral branches (known teleomorphs in *Tapesia*) ***Ramulispora***

7. Parasitic on dicotyledonous hosts, mostly causing leaf spots (known teleomorphs in *Mycosphaerella*) ***Pseudocercosporella***

8.(1) Saprobic, isolated from seeds, straw etc.; conidiophores short, geniculate to subdenticulate; conidial scars unthickened, not darkened; conidia catenate, ellipsoid-ovoid to subcylindrical, mostly 0-1-septate ***Cladophialophora***

8. Phytopathogenic, usually causing leaf spots **9**

9. Conidiomata synnematous **10**

9. Conidiophores solitary to fasciculate or conidiomata **11**

10. Conidia more or less obclavate (-subcylindrical), smooth or almost so, only transversely septate; conidial scars conspicuously darkened, slightly or hardly thickened ***Phaeoisariopsis***

10. Conidia scolecosporous; conidiophores in subsynnematous fascicles; conidial scars inconspicuous, unthickened ***Pseudocercospora***

11.(9) Conidiogenous cells monoblastic, determinate to percurrent, annellate; conidial scars neither thickened nor darkened **12**

11. Conidiogenous cells mono- to polyblastic, sympodial; conidial scars conspicuous, thickened, darkened, refractive or inconspicuous, neither thickened or darkened, but conidiogenous cells mainly sympodial or denticulate, rarely percurrent **14**

12. Stroma substomatal; hyphae superficial, above stomata, radiating, forming sporodochium-like plates; conidiophores arising from the radiating hyphae, solitary, aggregated, especially near stomata; conidia adhering in fragile chains, 0-1-septate, mostly non-septate ***Batcheloromyces***

12. Mycelium and conidiomata different, and/or conidia scolecosporous, and/or conidia solitary **13**

13. Conidiophores and conidia thin-walled; conidia smooth to roughened, annellations fine, often not conspicuous; conidia scolecosporous, acicular-subcylindrical, narrowly obclavate, transversely multiseptate (known teleomorphs in *Mycosphaerella*) ***Cercostigmina***

13. Conidiophores and conidia often thick-walled and verruculose; annellations conspicuous, often irregular; conidia with transverse, oblique and longitudinal septa, shape variable, non-scolecosporous or scolecosporous ***Stigmina***

14.(11) Conidial scars conspicuous, thickened, darkened and refractive **15**

14. Conidial scars inconspicuous, unthickened, neither darkened nor refractive; conidia scolecosporous; mycelium internal, or internal and external ***Pseudocercospora***

15. Conidiomata sporodochial, pulvinate, punctiform; stromata present, with a single or several swollen, erumpent cells which give rise to two or more curved conidiophores, not or hardly geniculate; conidia ellipsoid-subcylindrical to obclavate, distoseptate *Camptomeris*

15. Conidiophores arising from hyphae or stromata, but not two or more from vesicle-like cells; conidia euseptate (rarely distoseptate, but in this case conidiomata quite distinct) **16**

16. Mycelium internal and external (secondary), creeping or ascending leaf hairs **17**

16. Mycelium only internal, superficial hyphae absent **20**

17. Hyperparasitic; conidiogenous cells not conspicuously sympodial, non-geniculate; conidial scars lying more or less flat against the side of the conidiophore; conidia formed singly, scolecosporous, multiseptate *Eriocercospora*

17. Non-hyperparasitic, phytopathogenic, usually causing leaf spots **18**

18. Superficial hyphae characteristically verruculose; conidial scars minute, slightly thickened and darkened; conidia variable, solitary to catenate, continuous to multiseptate, usually verruculose *Stenella*

18. Superficial hyphae smooth (light microscopy) **19**

19. Conidia scolecosporous, solitary, with transverse and some oblique and longitudinal septa, fairly thick-walled, often with constrictions at septa *Sirosporium*

19. Conidia variable, solitary to catenate, scolecosporous to non-scolecosporous, only with transverse septa, thin-walled *Mycovellosiella*

20.(16) Conidia catenate *Phaeoramularia*

20. Conidia solitary **21**

21. Conidial scars conspicuous, hardly thickened, thickening confined to a narrow rim around the scar, only the thickened rim somewhat darkened, otherwise colourless; conidia scolecosporous *Paracercospora*

21. Conidial scars slightly to conspicuously thickened, but darkened throughout **22**

22. Conidiophores simple to branched; conidial scars somewhat thickened and darkened; conidia scolecosporous, distoseptate *Distocercospora*

22. Conidia euseptate, rarely distosepta present **23**

23. Conidiophores pigmented; conidial scars conspicuously thickened and darkened; conidia scolecosporous, acicular-subcylindrical (-filiform), hyaline or subhyaline (with a faint greenish tinge), multiseptate ***Cercospora***

23. Conidia non-scolecosporous, with few septa (usually 0-3), almost colourless to brown, or conidia scolecosporous, more or less obclavate-fusiform, multiseptate, pigmented, and/or conidial scars almost unthickened, somewhat darkened ***Passalora***

INTRODUCTION

Numerous cercosporoid fungi are associated with leaf spot diseases of plants worldwide. Because many of these fungi are host specific, several species have been found to be beneficial as potential biocontrol agents of weeds and other exotic plants (Morris, 1989; Morris & Crous, 1994). However, in South Africa, many of these fungi are also commonly associated with severe diseases of economically important crops such as cereals, vegetables, grasses, ornamentals and trees (Gorter, 1977, 1982).

Chupp & Doidge (1948) recorded and described several cercosporoid fungi from South Africa. These records were also incorporated into Chupp's monograph of the genus *Cercospora* (Chupp, 1954), which laid the foundation for a better circumscription of groups within *Cercospora*. Subsequent publications by Deighton (1967, 1971, 1973, 1974, 1976, 1979, 1983, 1987), Ellis (1971, 1976), Pons & Sutton (1988) and Braun (1988a, 1988b, 1989, 1990, 1993a, 1993b, 1994) defined numerous segregate genera in this complex. This has made it necessary to revise all South African records of these fungi lodged at the National Collection of Fungi, Pretoria (PREM). The present study forms the third contribution in a series aimed at revising local records of these fungi (Crous & Braun, 1994, 1995). As most of these fungi are still known locally under names generally accepted as synonyms elsewhere, all such synonyms are listed for each species according to the various works cited above, or based upon examination of type specimens in the present study. To facilitate further study, collection details (PREM), of all local and overseas specimens of species occurring in South Africa are also given. The total number of known taxa listed in this study is fairly small compared with the extremely rich South African flora, which is especially rich in endemic genera and species (Arnold & De Wet, 1993). It can therefore be surmised that numerous cercosporoid species are yet to be recorded and described from South Africa.

SPECIES CONSIDERED

1. ***africana*** *Distocercospora* Crous & U. Braun, Sydowia **46**: 208 (1994).

Specimens: Cape Province, Kentani, *Dioscorea* sp. (Dioscoreaceae), A. Pegler, 26 Apr. 1917, PREM 10125 (holotype); Natal, Gorge Walk, Royal Natal National Park, *Dioscorea sylvatica*, A.P. Baxter, May 1988, PREM 51112 (paratype).

2. ***ajugae*** *Ramularia* (Niessl.) Sacc., Fungi Ital. tab. 1009 (1881).

Fusidium ajugae Niessl., in Fuckel, *Jahrb. Nass. Ver. Naturk.* **15**: 35 (1861).
Cylindrospora ajugae (Niessl.) Schroet., in Cohn, *Krypt.-Fl. Schles., 3. Bd., Pilze, 2. Hälfte,* p. 491, Breslau (1897).
Ramularia ajugae var. *ajugae-pyramidalis* Sacc., *Syll. Fung.* **22**: 1325 (1913).
Ramularia tozziae Lindau, in Rabenh., *Krypt.-Fl. Deutschland, Oesterreich, Schweiz, 8. Abt., Fungi imperfecti: Hyphomycetes* (erste Hälfte) p. 501, Leipzig (1906).

Specimen: Transvaal, Heidelberg, Springs, *Ajuga* sp. (Lamiaceae), D. Garroway, 14 Feb. 1907, PREM 245.

Foreign specimens: Rabenh.-G. Winter, Fungi Europaei, *Ajuga reptans*, R. Staritz, Aug. 1884, PREM 3725; Herb. Thüm., PREM 5014, 5018; Flora dei Eark, *A. reptans*, P. Vogel, 25 Sept. 1914, PREM 18530; Herb. Ludwig, *A. reptans*, 17 Aug. 1913, PREM 18529; Mycotheca Veneta, *A. reptans*, Sept. 1876, PREM 6018; Syd., Mycotheca Germanica, *A. reptans*, 23 Jul. 1923, PREM 20219; Syd., Mycotheca Germanica, *A. reptans*, 19 Aug. 1929, PREM 26553; Hollós, Hungarian Fungi, *A. laxmanni*, PREM 23957.

3. ***apii*** *Cercospora* Fresen., *Beitr. Mycol.* **3**: 91 (1863) *s. str.*

Foreign specimens: Saccardo, Mycotheca Veneta 1053, *C. apii*, *Apium graveolens* (Apiaceae), C. Spegazzini, Oct. 1876, PREM 6023; Tanzania: Nduruma jum, nr. Arucha, on *Apium graveolens*, 23 Jun. 1927, G.B. Wallace 1164, IMI 8546, PREM 43790.

Pons & Sutton (1988) stated that *C. apii* is not restricted to genera of the Umbelliferae. They concluded that the species is very variable, and that the length of the conidiophores and conidia can be strongly influenced by changes in the relative humidity, temperature and light conditions. Furthermore, they also doubted the holomorph was *Mycosphaerella papuana* Sivan., as this has not been proved culturally, but only by close association. However, as no experimental proof of the polyphagous nature of *C. apii* has yet been presented, and several other studies have found that cercosporoid fungi, although morphologically similar, are highly host specific, we are of the opinion that it would be best to treat *C. apii* as occurring on *Apium* only. Chupp (1954) listed several varieties of *C. apii*, which he considered to be separate species in their own right. These have been treated elsewhere, as *Cercospora carotae* (Pass.) Kazn. & Siemaszko, and *Passalora pastinacae* (Sacc.) U. Braun.

Cercospora apii was first recorded from South Africa by Chupp & Doidge (1948), who cited specimen PREM 2099. In an examination of this specimen lesions were found to be colonized by species of *Ramularia* Unger, and *Pseudocercosporella* Deighton. However, Gorter (1977) reports *C. apii* to occur rather commonly on *Apium graveolens* in Natal, South Africa.

4. ***arachidicola*** *Cercospora* Hori, *Nishigahara Agri. Expt. Sta. Tokyo Ann. Rep.* p. 26 (1917).

Cercospora arachidis var. *macrospora* Maffei, *Riv. Pat. Veget.* **12**: 7 (1922).

Holomorph: *Mycosphaerella arachidis* Deighton, *Trans. Br. mycol. Soc.* **50**: 328 (1967).

Mycosphaerella arachidicola Jenkins, *J. Aric. Res.* **56**: 324 (1938) (homonym).

This species was reported by Gorter (1977) in Natal, but no voucher specimen was lodged at PREM.

5. *argyrolobii* *Pseudocercospora* (Chupp & Doidge) Deighton, *Mycol. Pap.* **140**: 139 (1976).

Cercospora argyrolobii Chupp & Doidge, *Bothalia* **4**: 881 (1948).

Specimen: Transvaal, Barberton, near falls at Nelspruit, *Argyrolobium wilmsii* (Fabaceae), L.C.C. Liebenberg, Apr. 1931, PREM 26075 (holotype).

6. *asparagi* *Cercospora* Sacc., *Michelia* **1**: 88-89 (1877).

Foreign specimen: Saccardo, Mycotheca Veneta 1052, *Asparagus officinalis* (Asparagaceae), Sept. 1875, PREM 6022.

Gorter (1977) recorded this species from the Transvaal, but did not deposit voucher material.

7. *avicularis* *Passalora* (G. Winter) Crous, U. Braun & Morris, *S. Afr. J. Bot* **60**: 329 (1994).

Cercospora avicularis G. Winter, *J. Mycol.* **1**: 125 (1885), also *Hedwigia* **24**: 202 (1885).
Pseudocercospora avicularis (G. Winter) Khan & Shamsi, *Bangladesh J. Bot.* **12**: 108 (1983).

Specimen: Eastern Cape, Hankey, *Polygonum aviculare* (Polygonaceae), M.J. Morris, 8 Nov. 1990, PREM 51712.

8. *balladynae* *Eriocercospora* (Hansf.) Deighton, *Mycol. Pap.* 118: 6 (1969).

Helminthosporium balladynae Hansf., *Proc. Linn. Soc. Lond.* **157**: 39 (1945).
Cercospora schiffnerulae Hansf., *Mycol. Pap.* **15**: 216 (1946).
Cercospora balladynae Hansf., *Proc. Linn. Soc. Lond.* **158**: 50 (1947).

Specimen: Cape Province, George, hyperparasite on *Asterina hendersonii* Doidge, on *Ilex mitis* (Aquifoliaceae), Nov. 1940, PREM 32471.

9. *bauhiniae* *Pseudocercospora* (Syd. & P. Syd.) Deighton, *Mycol. Pap.* **140**: 140 (1976).

Cercospora bauhiniae Syd. & P. Syd., *Ann. Mycol.* **12**: 202 (1914).
Holomorph: *Mycosphaerella piliostigmatis* T. Kobayashi & de Guzman, *Bull. Forest. Forest Prod. Res. Inst.* **351**: 157 (1988).

Specimens: Transvaal, Barberton, Nelspruit Research Station, *Bauhinia galpini* (Fabaceae), L.C.C. Liebenberg, Apr. 1931, PREM 26057; Transvaal, Tzaneen, *B. galpini*, L.C.C. Liebenberg, Jun. 1939, PREM 32734; Transvaal, Schagen, Nelspruit district, *B. galpini*, L.C.C. Liebenberg, 13 Jul. 1936, PREM 32879; Transvaal, Schagen, *B. galpini*, A. Tompson, 14 Apr. 1978, PREM 45427.

Foreign specimens: Flora of the Philippines, Herbarium, Bureau of Science, Province of Rizal, Luzon, *B. malabarica*, M. Ramos, Dec. 1915, No. 23960, PREM 13558; Philippines, Mt. Maquiling, near Los Baños, Prov. Laguna, *B. malabarica*, C.F. Baker, Dec. 1913, PREM 9330 (isotype).

10. ***berkheyae*** *Mycovellosiella* (Syd.) U. Braun & Crous, *Mycol. Res.* **99**: 32 (1995).

Cladosporium berkheyae Syd., *Ann. Mycol.* **12**: 267 (1914).
Fulvia berkheyae (Syd.) M.B. Ellis, *More Dematiaceous Hyphomycetes*, p. 315, Kew (1976).

Specimen: Natal, Cramond, *Berkheya* sp. (Asteraceae), J.B. Pole Evans, PREM 6852, ex Herb. Syd. at S (holotype).

11. ***berkheyae-maritimae*** *Mycovellosiella* Crous & U. Braun, *Mycol. Res.* **99**: 32 (1995).

Specimen: Natal, Donnybrook, Nxumeni Forestry Station, *Berkheya maritima* (Asteraceae), R.Y. Anelich, May 1988, PREM 51127 (holotype).

12. ***beticola*** *Cercospora* Sacc., *Nuov. Giorn. Bot. Ital.* **8**: 189 (1876).

Cercospora betae Frank, *Krankh. d. Pflanz.* p. 601 (1880).
Fusarium betae Sacc., *Michelia* **2**: 132 (1880).
Cercospora flagelliformis E. & H., *N. Jer. Ann. Rept.* **1890**: 355 (1891).
Cercospora anthelmintica G.F. Atk., *J. Elisha Mitchell Sci. Soc.* **8**: 49 (1892).
Cercospora spinaciae Oudem., *Nederl. Kruidk. Arch. III*, **2**: 324 (1900).
Cercospora chenopodiicola Bres., *Hedwigia* **39**: 328 (1900).
Cercosporina spinacicola Sacc., *Nuov. Giorn. Bot. Ital. N.S.* **22**: 73 (1915).
Fusisporium betae Desm., *Ann. Sci. Nat. 2 ser.* **19**: 434 (1843).
Pionnotes betae Sacc., *Syll. Fung.* **4**: 726 (1886).
Cercospora longissima Cooke & Ellis, *Grevillea* **17**: 65 (1889).

Specimens: Cape Province, Stellenbosch, *Beta vulgaris* (Chenopodiaceae), L. Verwoerd, Dec. 1924, PREM 46171; Stellenbosch, *B. vulgaris*, Dec. 1927, PREM 34281; Transvaal, Marionhill, *B. vulgaris*, V.A. Wager, PREM 34582; Cape Province, Port Elizabeth, Newton Park, Frames Drift, *B. vulgaris*, J. Fitzgerald Barron, 9 Feb. 1943, PREM 33883.

Foreign specimens: Ellis & Everh., Fungi Colombiani, *B. vulgaris*, Newfield, N.J., Aug. 1893, PREM 49946; Australia, Durras North, NSW, *Chenopodium glaucum* L., J. Walker, 11 Jan. 1979, DAR 34148, PREM 48806 (occurring in association with *Physoderma pulposum* Wallr.).

13. *bidentis* *Cercospora* Tharp, *Mycologia* **9**: 108 (1917).
Cercospora bidentis Marchal & Steyaert, *Bull. Soc. Roy. Bot. Belgique* **61**: 167 (1929).

Specimen: Natal, Pietermaritzburg, Ukulinga, *Bidens pilosa*, (Asteraceae), P.S. Knox-Davies, 17 May 1955, PREM 41441.

Although *C. bidentis* is not known to occur on *Senecio*, Wager (1972) recorded it from this host.

14. *bolleana* *Passalora* (Thuem.) U. Braun, *Mycotaxon* **54**: in press (1995).
Cercospora bolleana (Thuem.) Speg., *Michelia* **1**: 475 (1879).
Septosporium bolleanum de Thuemen, *Oestrr. Bot. Zeitschr*. **27**: 12 (1877).
Cercospora sycina Sacc., *Mycotheca Veneta*, 1564 (1881).
Holomorph: *Mycosphaerella bolleana* Higgins, *Amer. J. Bot*. **7**: 443 (1920).

Specimens: Transvaal, Pretoria, *Ficus carica* (Moraceae), C.B. Eastwood, 14 Jan. 1906, PREM 103 (specimen depauperate); Transvaal, Potgietersrust, *F. carica*, M. de Villiers, Jan. 1941, PREM 32491.

Foreign specimens: Sacc., Mycotheca Veneta 1564, as *Cercospora sycina* Sacc., *F. carica*, Sept. 1878, PREM 6534; Briosi & Cavara 85, Orto Botanico di Pavia, *F. carica*, Autumn 1889, PREM 7917.

15. *brachiata* *Cercospora* Ellis & Everh., *J. Mycol*. **4**: 5 (1888).
Cercospora amaranti Lobik, *Bolezni Rast*. (*Morbi Plantarum*) **17**: 193 (1928).

Specimen: Natal, Cramond, *Amaranthus hybridus* (Amaranthaceae), S. R. McLennan, 1 May 1990, PREM 51699.

16. *brachycarpa* *Mycovellosiella* (H. Syd.) Deighton, *Mycol. Pap*. **137**: 8 (1974).
Cercospora brachycarpa Syd., *Ann. Mycol*. **28**: 207 (1930).
Cercospora jaguarensis Chupp & Muller, *Bol. Soc. venez. Cienc. nat*. **8**: 48 (1942).
Cladosporium solanicola Viégas, *Bragantia* **6**: 368 (1946)
Mycovellosiella solanicola (Viégas) Muntañola, *Lilloa* **30**: 178-190 (1960).

Specimens: Natal, Donnybrook, *Solanum auriculatum* (Solanaceae), 5 Sept. 1937, IMI 317760, PREM 29831; Natal, Pietermaritzburg, *S. auriculatum*, J.B. Pole Evans, 7 Apr. 1911, PREM 1391; Natal, Pietermaritzburg, *S. auriculatum*, E.M. Doidge, 26 Jun. 1911, PREM 1623.

Foreign specimens: Fungos do Brasil, *S. auriculatum*, A.C. Batista, 20 Feb. 1961, PREM 43626; Fungos do Brasil, *S. auriculatum*, A.C. Batista, 13 Oct. 1959, PREM 43533; Petrak, Mycotheca Generalis, *S. lycopersicum*, Aug. 1942, PREM 38622; England, Sussex, *Lycopersicum* sp., P.H.B. Talbot, 4 Aug. 1947, PREM 36504; Briosi & Cavara, *S. lycopersicum*, 1898, PREM 8138.

17. *brassicola* *Cercospora* P. Henn., *Engl. Bot. Jahrb.* **37**: 166 (1906).

Cercospora bloxami (Berk. & Br.) *emend* Young, *Mycologia* **8**: 43 (1916).

Cercospora brassicae-campestris Rangel, *Arch. Mus. Nacion., Rio de Janeiro* **18**: 163 (1917).

Foreign specimen: Fungi Malayana, Philippines, Mt. Maquiling, near Los Baños, Laguna Province, *Brassica chinensis* (Brassicaceae), C.F. Baker, Jan. 1914, PREM 9332.

Although this species was reported by Gorter (1977), its identity and occurrence has not been confirmed, and there are no local specimens lodged at PREM.

18. *byliana* *Pseudocercospora* (H. Syd.) Yen, in Yen & Lim, *Gardens' Bull., Singapore* **33**: 170 (1980).

Cercospora byliana H. Syd., *Ann. Mycol.* **22**: 433 (1924).

Specimen: Transvaal, Tzaneen, *Allamanda cathartica* (Apocynaceae), P.A. van der Bijl, Jul. 1924, PREM 34277 (holotype).

This specimen was collected by Prof. Paul van der Bijl, and named in his honour by Sydow. Paul van der Bijl was also the first head of Department of Plant Pathology and Microbiology at the University of Stellenbosch in 1921, which was the first Department of Plant Pathology in the Union of South Africa.

19. *caffra* *Stigmina* (Wakefield) M.B. Ellis, *Mycol. Pap.* **72**: 42-43 (1959).

Pucciniopsis caffra Wakefield, *Kew Bull.*, p. 205 (1931).

Specimens: Cape Province, Van Stadens's Pass, *Erica caffra* (Ericaceae), E.M. Doidge, 13 Nov. 1917, No 10865, PREM 38042 (holotype); Cape Province, Grahamstown, Howieson's Poort, *E. caffra*, E.M. Doidge, Nov. 1917, No. 10964, PREM 38043.

The illustration given by Ellis (1976) of this species suggests that it might be better accommodated in *Cercostigmina*. However, an examination of the syntype (PREM 10865) showed the conidiogenous cells to vary from verrucose to finely verruculose, and the annellations to be irregular, unlike those illustrated by Ellis (1976). This species is therefore best retained in *Stigmina*.

20. *canescens* *Cercospora* Ellis & Martin, Am. Nat. **16**: 1003 (1882).

Cercospora vignicaulis Tehon, *Mycologia* **29**: 436 (1937).

Specimen: Transvaal, Barberton, Nelspruit Research Station, *Dolichos* sp. (Fabaceae), L.C.C. Liebenberg, May 1931, PREM 26070.

Foreign specimens: Africa, Tanganyika, Moshi, *Phaseolus lunatus*, Mar. 1943, IMI 4146, PREM 43791; Ellis & Everh., Fungi Colombiani, Newfield, N.J., *Phaseolus* sp., Sept. 1894, PREM 49947; Rabenh.-G. Winter, Fungi Europaei 3788, *Phaseolus* sp., C.H. Demetrio, Aug. 1885, PREM 4128.

The combination *Cercosporiopsis canescens* (Ellis & Martin) Miura cannot be accepted because the genus *Cercosporiopsis* is illegitimate.

21. *capsellae* *Pseudocercosporella* (Ellis & Everh.) Deighton, *Mycol. Pap.* **133**: 42 (1973).

Cylindrosporium capsellae Ellis & Everh., *J. Mycol.* **3**: 130 (1887).
Cercoseptoria capsellae (Ellis & Everh.) Greene, *Trans. Wis. Acad. Sci. Art. Lett.* **47**: 127 (1959).
Cylindrosporium brassicae Faut. & Roum., *Revue Mycol.* **13**: 61 (1891).
Cercosporella brassicae (Faut. & Roum.) Höhn., *Ann. Mycol.* **22**: 193 (1924).
Cercospora brassicae (Faut. & Roum.) Chupp in Weiss *et al.*, *Agric. Handbook U.S. Dep. Agric* **165**: 99 (1960), *comb. inval.*
Ovularia brassicae Bres., in *Allescher. Bet. bot. Ver. Landshut* **12**: 94 (1892).
Cercospora (*Cercosporella*) *albomaculans* Ellis & Everh., *Proc. Acad. nat. Sci. Philad.* **1894**: 378 (1894).
Cercosporella albomaculans (Ellis & Everh.) Sacc., *Syll. Fung.* **11**: 606 (1895).
Ramularia rapae Pim, *J. Bot. Lond.* **35**: 58 (1897).
Cercosporella brassicae Jaap, *Fungi sel. exsic.* p. 846 (1916), *nom. nud.*
Cercosporella raphanistri Baudys & Picbauer, *Acta Soc. Sci. nat. moravosiles.* **1**: 305 (1924).
Cylindrosporium nesliae Bubak, *Ann. Mycol.* **14**: 346 (1916).
Cercosporella nesliana Baud. & Pic., *Acta Soc. Sci. nat. moravosiles.* **1**: 306 (1924).
Ramularia chorisiae Lobik, *Bolez. rast.* **17**: 190 (1928).

Cercosporella nesliana Dearness & Bisby in Bisby, Butler & Dearness, *The Fungi of Manitoba*, p. 125 (1929).
Cercosporella isatidis Melnik, *Nov. sist. niz. rast.* **8**: 201 (1971).
Cercosporella conringiae Annalijev, *Nov. Sist. niz. Rast.* **9**: 195 (1972).
Cercosporella goldbachiae Annalijev, *Nov. Sist. niz. Rast.* **9**: 196 (1972).
Cercosporella litvinoviae Annalijev, *Nov. Sist. niz. Rast.* **9**: 200 (1972).
Cercosporella malcolmiae Annalijev, *Nov. Sist. niz. Rast.* **9**: 202 (1972).
Cercosporella cardariae Vasjagina, in Shvarcman *et al.*, *Fl. spor. rast. Kazakhstana*, Tom 8, p. 488, Alma-Ata 1973.
Ramularia camelinae Ossipjan, *Mikofl. Arm. SSR 3, Gifalnye Griby (Moniliales)*, p. 559, Erevan 1975.
Cercosporella crambes Annalijev, *Nov. sist. niz. rast.* **18**: 57 (1981).
Holomorph: *Mycosphaerella capsellae* A.J. Inman & A. Sivanesan, *Mycol. Res.* **95**: 1339 (1991).

Specimens: Transvaal, Johannesburg, Bedford farm, *Brassica campestris* (Brassicaceae), 22 Mar. 1910, PREM 777; Natal, Underberg, *B. rapa*, V.A. Wager, 6 Apr. 1943, PREM 34108; Natal, Humeville, *B. rapa*, V.A. Wager, 20 May 1944, PREM 34109; Western Cape, Stellenbosch, Vredenburg Farm, *Raphanus raphanistrum* L., M.J. Morris, 2 Jul. 1992, PREM 51709; Western Cape, McGregor, *R. raphanistrum*, M.J. Morris, 28 Jul. 1992, PREM 51710; Western Cape, Stellenbosch, Banhoek, *R. raphanistrum*, M.J. Morris, 15 Oct. 1981, PREM 51711.

Foreign specimen: Petrak, Mycotheca Generalis, *B. sativa*, J. Lind., Oct. 1916, PREM 23247.

22. ***caricis*** *Cercospora* Oudem., *Nederl. Kruidk. Arch. II*, **6**: 59 (1892).

Cercospora caricina Ellis & Dearness, *Proc. Can. Inst. n.s. Part 3*, **1**: 91 (1897).
Cercospora microstigma Sacc., *Ann. Mycol.* **10**: 1912.
Cercospora caricis Dearness & House, *N.Y. State Mus. Bul.* **188**: 29 (1916).

Specimens: Cape Province, Stellenbosch, Vredenburg Research Farm, *Cyperus rotundus* (Cyperaceae), M. Morris, 6 Feb. 1992, PREM 50954; Natal, *Cyperus esculentus*, M. van Schoor, 6 Feb. 1992, PREM 50953 (depauperate); Cape Province, Stellenbosch, Vredenburg Research Farm, *C. rotundus*, M. van Schoor, 6 Feb. 1992, PREM 50955.

Conidiophores of PREM 50954 are olivaceous, up to 40 µm long, 4-6 µm wide, reduced to conidiogenous cells, and occur in dense tufts, with up to 15 per fascicle. Conidiogenous cells are olivaceous brown, straight, rarely geniculate, cylindrical, seldomly sympodial, mostly only having one apical locus that is thickened, darkened and refractive. Conidia are hyaline, cylindrical, 60-80 x 3-3.5 µm, 3-4-septate, cylindrical-acicular, with a rounded apex, truncate base, and thickened, refractive hila. Pollack (1987) reports several *Cercospora* species from *Cyperus*. Of these, *Cercospora cyperi* Sawada, *C. cyperi-rotundri* Thirum. & Gov., and *C. cyperi-fusci* Sandu-Ville have long, acicular conidia which are apically pointed. The fungus on PREM 50954 fits the description of *C. caricis*, which has more cylindrical conidia with obtuse apices. Further studies including pathogenicity tests on *Carex* and *Cyperus* are required if this issue is to be resolved.

23. ***carotae*** *Cercospora* (Pass.) Kazn. & Siemaszko, *Zbl. Bakt. 2*, **78**: 115 (1929).

Cercospora apii var. *carotae* Pass., *Atti. Real. Accad. Lincei, Roma. ser. 4*, **6**: 469 (1889).

Specimen: Cape Province, Stellenbosch, *Daucus carota* (Apiaceae), B.J. Dippenaar, 11 Feb. 1941, PREM 46983.

Foreign specimens: Australia, N.S.W., Coleambally, Riverina distr., *D. carota* var. *sativa*, L. Cunial, 14 Oct. 1966, PREM 45236; Petrak, Mycotheca Generalis, *D. carota*, Oct. 1943, PREM 38641.

Ellis (1976) uses the combination *C. carotae* (Pass.) Kazn. & Siemaszko (1929), and not *C. carotae* (Pass.) Solheim (1929) as used by Chupp (1954), suggesting that Kazn. & Siemaszko published their combination a few months prior to that of Solheim.

24. ***carpophila*** *Stigmina* (Lév.) M.B. Ellis, *Mycol. Pap.* **72**: 56 (1959).

Helminthosporium carpophilum Lév., *Ann. Sci. nat. Ser.* **2**, 19: 215 (1843).

Clasterosporium carpophilum (Lév.) Aderhold, *Landw. Jb.* **30**: 815 (1901).

Coryneum carpophilum (Lév.) Jauch, *Int. Bul. Pl. Prot.* **14**: 99 (1940).

Macrosporium rhabdiferum Berk., *Gdner's Chron.*, p. 938 (1864).

Helminthosporium rhabdiferum (Berk.) Berk. *apud* Berk. & Broome, *Ann. & Mag. nat. Hist. Ser. 3*, **15**: 403 (1865).
Sporidesmium amygdalearum Pass., *Boll. Co. agr. Parma*, p. 1875 (1875).
Clasterosporium amygdalearum (Pass.) Sacc., *Michelia* **2**: 557 (1882).
Passalora brunaudii Sacc., *Michelia* **1**: 537 (1879).
Napicladium brunaudii Sacc., *Michelia* **1**: 537 (1879).
Coryneum beyerinckii Oudem., *Hedwigia* **22**: 115 (1883).
Septosporium cerasorum Thüm., *Ost. Wbl.* **1884**: 259 (1884).
Helminthosporium cerasorum (Thüm.) Berl. & Vogl. *apud* Sacc., *Syll. Fung. Addit.*, p. 382 (1886).
Stigmina briosiana Farn., *Atti Ist. bot. Univ. Pavia, Ser. 2*, **7**: 23 (1902).

Doidge (1950) reported *Clasterosporium carpophilum* (Lév.) Aderhold on *Prunus armeniaca*, but no reference specimen could be located at PREM.

25. *caryae* *Cercospora* Chupp & Doidge, *Bothalia* **4**: 882 (1948).

Specimens: Transvaal, Alkmaar, Alkmaar Estates, *Carya pecan* (Juglandaceae), Apr. 1930, PREM 25441 (holotype); Transvaal, Nelspruit, P.O. Plaston, *C. pecan*, V.A. Wager, 3 Jun. 1935, PREM 28264.

The hyaline, acicular conidia with thickened, refractive hila, and olivaceous brown conidiophores with darkened, thickened, refractive conidial scars confirm this to be a true *Cercospora* species.

26. *cassinopsidis* *Cercospora* G. Winter, *Hedwigia* **24**: 34 (1885).

Specimen: Cape Province, Somerset-East, *Cassinopsis capensis* (Icacinaceae), MacOwan.

Chupp (1954) could not trace the type specimen. In the present study, no material could either be located at PREM, B or S. The original description mentions pale yellowish conidia, and non-fasciculate conidiophores, suggesting that this is not a *Cercospora* species.

27. *celastri* *Stigmina* (Kalchbr.) M.B. Ellis, *Mycol. Pap.* **72**: 47 (1959).

Exosporium celastri Kalchbr. *apud* Kalchbr. & Cooke, *Grevillea* **9**: 24 (1880).

Specimens: Cape Province, *Celastrus buxifolius* (Celastraceae), MacOwen 1396, PREM 75318 (holotype); Transvaal, Louis Trichardt, Hangklip Forest Station, *Maytenus heterophylla*, R.Y. Anelich, Apr. 1988, PREM 51110, 51125.

28. *cichorii* *Cercospora* Davis, *Trans. Wisc. Acad. Sci. Art. Lett.* **19**: 715 (1919).

Cercospora cichorii-intybi Woronichin, *Trav. Mus. Bot. Acad. Sci. USSR* **21**: 233 (1927).

Specimens: Cape Province, Alexandria, *Cichorium intybus* (Asteraceae), J.C. Erasmus, Jun. 1941, PREM 33203; Cape Province, Alexandria, *C. intybus*, J.C. Erasmus, 28 Feb. 1941, PREM 32809.

Annotations on the herbarium specimens at PREM suggest that Saccardo proposed a new combination *Cercosporina cichorii* (Dav.) Sacc. However, *Cercosporina* was never accepted as distinct from *Cercospora*.

29. *circumscissa* *Passalora* (Sacc.) U. Braun, *Mycotaxon* **54**: in press (1995).

Cercospora circumscissa Sacc., *Nuov. Giorn. Bot. Italy* **8**: 189 (1876).
Cercospora cerasella Sacc., *Michelia* **1**: 266 (1879).
Cercospora cerasella var. *avium* Roum., *Rev. Mycol.* **18**: 71 (1896).
Cercospora padi var. *mahaleb* Unam., *Bol. Soc. Espan. Hist. nat. Madrid* **35**: 435 (1935).
Cercospora padi Bubak & Serebriankov, *Hedwigia* **52**: 271 (1912).
Cercospora pruni-persicae Sawada, *Spec. Publ. 8, Coll. Agric. Nat. Taiwan Univ.* **11**: 215 1959, *nom. nud.*
Holomorph: *Mycosphaerella cerasella* Aderhold, *Ber. Deutsch. Bot. Ges.* **18**: 246 (1900).

Specimens: Cape Province, Kingwilliamstown, *Prunus avium* (Rosaceae), J. Dreyer, Feb. 1911, PREM 1187.

Foreign specimens: Ellis & Everh., Fungi Colombiani, Newfield, N.J., *Prunus serotina*, PREM 49949; Petrak, Mycotheca Generalis, *P. spinosa*, Aug. 1928, PREM 37625; Rabenh.-G. Winter-Pazschke, Fungi Europaei 4091, *P. serotina*, C.H. Demetrio, PREM 4431.

30. *citrullina* *Cercospora* Cooke, *Grevillea* **12**: 31 (1883).

Cercospora cucurbitae Ellis & Everh., *J. Mycol.* **4**: 3 (1883).
Cercospora sechii Stevenson, *P. Rico, Ins. Exp. Sta. Dept. Agr. Ann. Rept.* 1917-1918: 137 (1919).
Cercospora trichosanthis McRae, *Ann. Crypt. Exotique* **2**: 270 (1929).

Cercospora momordicae McRae, *Ann. Crypt. Exotique* **2**: 267 (1929).
Cercospora luffae Hara, *Diseases of cultivated plants*, p. 228 (1928?).
Cercospora chardoniana Chupp, *Monographs, Univ. P. Rico, B.* **2**: 245 (1934).
Cercospora momordicae Mendoza, *Philipp. J. Sci.* **75**: 173 (1941).
Cercospora momordicae Sawada, *Formosa Agr. Res. Inst. Rept.* **86**: 173 (1943).

Specimen: Cape Province, Kentani, *Momordica cordifolia* (Cucurbitaceae), A. Pegler, 11 May 1918, PREM 11679.

31. *clerodendri Pseudocercospora* (Miyake) Deighton, *Mycol. Pap.* 140: 141 (1976).

Cercospora clerodendri Miyake, *Bot. Mag. Tokyo* **27**: 53 (1913).
Cercospora clerodendricola Sawada, *Spec. Publ. 8, Coll. Agric. Nat. Taiwan Univ.* **11**: 215 (1959) *nom. nud.*

Specimen: Transvaal, Barberton, near Nelspruit falls, *Clerodendrum myricoides* (Verbenaceae), L.C.C. Liebenberg, May 1931, PREM 26012.

Although Chupp & Doidge (1948) comment on their uncertainty regarding PREM 26012, this specimen is a true *Pseudocercospora*, closely fitting the description later given by Chupp (1954).

32. *clutiicola Pseudocercospora* Crous & U. Braun, *Sydowia* 46: 214 (1994).

Specimen: Northern Transvaal, Zoutpansberg, Pisanghoek, *Clutia* cf. *affinis* (Euphorbiaceae), M. Bosman, 1929, PREM 32896 (holotype).

Chupp (1954) incorrectly lists the host genus as "*Cluytia*" (Arnold & De Wet, 1993).

33. *cocculi Stigmina* Crous & U. Braun sp. nov. Fig. 1.

Maculae amphigenae, atro-brunneae, angulares, per venas limitatae, 1-4 mm latae. *Mycelium* immersum: hyphae laeviae, brunneae. *Stromata* 20-180 x 10-40 µm. *Conidiomata* (= sporodochia) hypophylla, densa, effusa, brunnea, 50-200 x 40-80 µm. *Conidiophora* numerosa, dense fasciculata, brunnea, verruculosa, cylindrica vel ampulliformia, recta vel 1-geniculata, 1-4-septata, 25-80 x 4-8 µm. *Cellulae conidiogenae* integratae, terminaliae, brunneae, verruculosae, cylindricae, rectae vel geniculatae-sinuosae, ad apicem leniter attenuatae, rotundatae, percurrentes, 10-30 x 5-6 µm. *Conidia* solitaria, pallide brunnea, verruculosa, guttulata, 0-5-septata, 17-70 x 5-7 µm, obclavata, recta vel curvata, ad apicem rotundata, basi in hilum attenuata, subtruncata, non incrassata.

Leaf spots amphigenous, dark brown, angular, confined by leaf veins, 1-4 mm diam. *Mycelium* internal, composed of smooth, brown hyphae, forming stromata, 20-180 µm wide, 10-40 µm high. *Conidiomata* hypophyllous, dense, effuse, sporodochial, brown, 50-200 µm wide, 40-80 µm high. *Conidiophores* in dense, rich fascicles, arising from stromata, brown, verruculose, cylindrical or ampulliform, straight or once geniculate, 1-4-septate, 25-80 x 4-8 µm. *Conidiogenous cells* integrated, terminal, brown, verruculose, cylindrical, straight or geniculate-sinuous, somewhat tapering to a rounded apex, producing conidia by enteroblastic percurrent proliferation leaving up to 4 transverse, verruculose, irregular annellations, 10-30 x 5-6 µm. *Conidia* light brown, solitary, apical, verruculose, guttulate, 0-5-septate, 17-70 x 5-7 µm, obclavate, straight or variously curved, tapering from an obconically subtruncate base to a bluntly rounded apex, with an unthickened, but slightly refractive hilum.

Specimens: Transvaal, Mariepskop, *Cocculus hirsutus* (Menispermaceae), W.F.O. Marasas, 1962, PREM 42682 (holotype); Transvaal, Barberton, Nelspruit Research Station, *C. hirsutus*, L.C.C. Liebenberg, 22 Aug. 1931, PREM 25975 (paratype).

Ellis (1976) reported *Cercospora cocculi* H. Syd. from South Africa. This species was transferred to *Pseudocercospora* by Deighton (1976). However, in an examination of South African material an undescribed species of *Stigmina* was found. This species is characterized by having conidiogenous cells with irregular annellations, and conidia with slightly darkened, refractive hila. Based on the latter criteria it is a species of *Stigmina*. Chupp (1954) described *C. cocculi* to differ from the South African material regarding the conidiogenous cells and conidia, while Ellis (1976) illustrated darkened scars on the conidiogenous cells, and Hsieh & Goh (1990) illustrated conidiophores also occurring separately on secondary mycelium. These discrepancies suggest that several other distinct species are currently treated under *P. cocculi*.

34. ***coffeicola*** *Cercospora* Berkeley & Cooke, *Grevillea* **9**: 99 (1881).

Cercospora coffeae Zimm., *Ber. Land-u. Forstw. Deut. Ostafr.* **2**: 35 (1904).
Cercospora herrerana Farn., *Atti Inst. Bot. R. Univ. Pavia, ser.* 2, **9**: 37 (1911).
Holomorph: *Mycosphaerella coffeicola* (Cooke) Steven. & Wellm., *J. Wash. Acad. Sci.* **34**: 262 (1944).
Mycosphaerella coffeicola (Cooke) Ciferri, *Ist. Bot. Reale Univ. Reale Lab. Crittog. Pavia Atti, ser. 5*, **19**: 118 (1962).

Specimen: Transvaal, Barberton, Nelspruit Research Station, *Coffea* sp. (hybrid) (Rubiaceae), L.C.C. Liebenberg, Jun. 1931, PREM 26022.

Foreign specimens: Zaire, Elisabethville, *C. arabica*, C. Seydel, May 1933, PREM 26699; Uganda, *C. arabica*, R.O. Dümmei, Jan. 1919, PREM 11934; Uganda, Nairobi, *C. arabica*, 12 Feb. 1917, PREM 10133.

35. ***commelynae*** (*Cercospora*) Kalchbr. & Cooke, *Grevillea* **9**: 24 (1881).

Specimen: Natal, Durban, Stellabush, *Commelyna* sp. (Commelinaceae), E.M. Doidge, 27 Nov. 1940, PREM 32777.

Foreign specimen: Fungi Aequatoriensis, *Commelyna* sp., Syd., 9 Nov. 1937, PREM 36012.

Chupp (1954) examined the type specimen lodged at Kew (MacOwen 1346), and concluded that *C. commelynae* was not a *Cercospora* species, but probably belonged in *Septoria*. An examination of another South African collection (PREM 32777) determined by Chupp & Doidge (1948) to be *C. commelynae*, confirmed that the fungus is a species of *Septoria*. A foreign specimen from the same host (PREM 36012) was found to represent *Cercospora commelinicola* Chupp.

36. ***cruciferarum*** *Cercospora* Ellis & Everh., *J. Mycol.* 3: 17 (1887).

Specimen: Eastern Cape, Mocuba, near Port Elizabeth, *Raphanus sativus* (Brassicaceae), T. Carvalho, 23 Sept. 1946, PREM 36739.

Conidia of the South African specimen are 50-160 x 4-5 µm, thus slightly longer than those reported by Chupp (1954). However, the general feartures of this collection comply well with that of *C. cruciferarum*. This is a new record for South Africa.

37. ***corchori*** *Cercospora* Sawada, *Agr. Exp. Sta. Formosa Sp. Bull.* **19**: 37 (1919).

Specimens: Transvaal, Nelspruit, Schagen, *Corchorus* sp. (Tiliaceae), L.C.C. Liebenberg, Apr. 1932, PREM 26309; Transvaal, Barberton, Nelspruit Research Station, *C. tridens*, L.C.C. Liebenberg, May 1931, PREM 26001.

38. ***cruenta*** *Pseudocercospora* (Sacc.) Deighton, *Mycol. Pap.* **140**: 142 (1976).

Cercospora cruenta Sacc., *Michelia* **2**: 149 (1880).
Cercospora phaseolorum Cooke, *Grevillea* **12**: 30 (1883).
Cercospora vignae Ellis & Everh., *J. Mycol.* **3**: 19 (1887).
Cercospora dolichi Ellis & Everh., *J. Mycol.* **68**: 72 (1889).
Cercospora vignae Raciborski, *Zeit. Pflanzenkr.* **8**: 66 (1898).
Cercospora raciborskii Mats. & Nag., *Jour. Plant Protect.* (Byochugaizashi) **18**: 714-722 (1931).
Cercospora vignae-sinensis Tai & Wei, *Sinensia* **4**: 126 (1933).
Cercospora neovignae Yamamoto, *Trans. Sappro. nat. Hist. Soc.* **13**: 142 (1934).
Cercospora vignae-sinensis Sawada, *Taiwan Agric. Res. Inst. Rept.* **85**: 125 (1943) *nom. nud.*
Holomorph: *Mycosphaerella cruenta* Latham, *Mycologia* **26**: 516-527 (1934).

Specimen: Transvaal, Pretoria, *Vigna* sp. (Fabaceae), L.C.C. Liebenberg, PREM 40213.

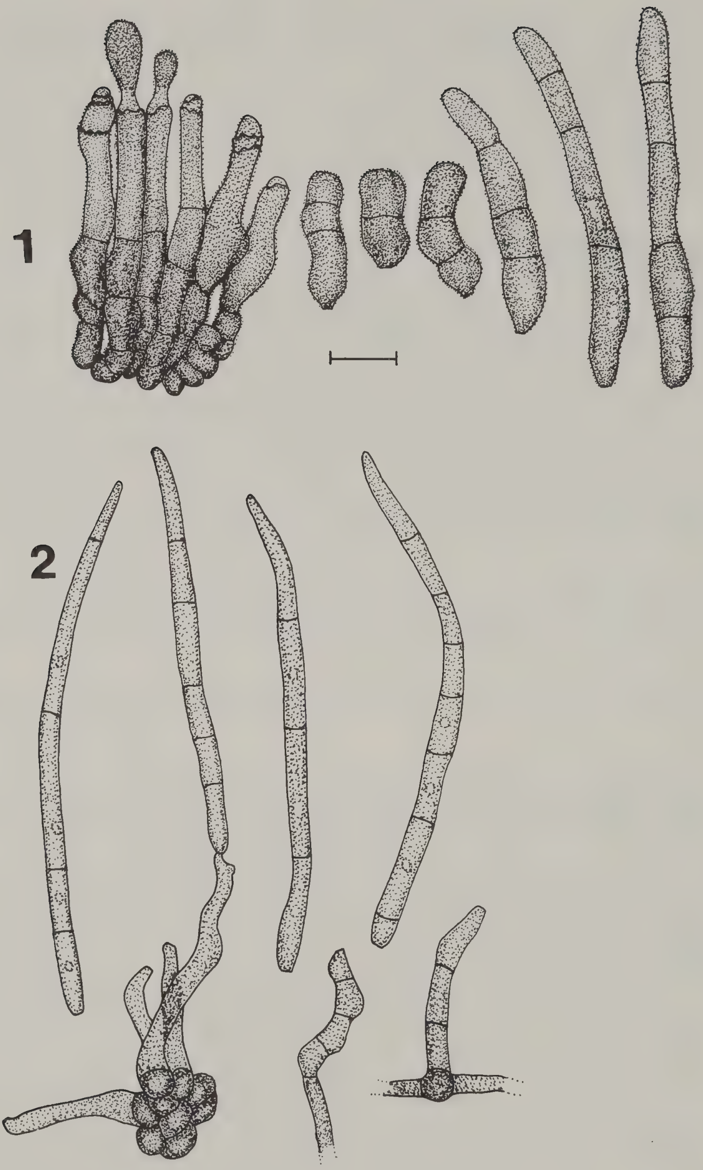
Foreign specimen: Fungos do Brasil No. 17124, *Vigna sinensis*, I. Vasconcelos, 4 May 1959, PREM 43507.

Doidge (1950) also lists this species on *Phaseolus vulgaris*.

39. ***curtisiae*** *Pseudocercospora* (Chupp & Doidge) Crous & U. Braun comb. nov. Fig. 2.

Cercospora curtisiae Chupp & Doidge, *Bothalia* **4**: 884 (1948).

Leaf spots amphigenous, discrete, subcircular, 2-4 mm diam., dark brown, with grey centres. *Mycelium* internal and external; hyphae smooth, olivaceous brown, septate, branched, 3-4 µm diam., giving rise to stromata or single conidiophores; stromata dark brown, 20-60 µm diam., consisting of pseudoparenchymatous cells. *Caespituli* hypophyllous, brown, 30-70 µm wide, 30-40 µm high. *Conidiophores* fasciculate, arising from stromata, or solitary, arising from secondary mycelium, 1-3-septate, olivaceous brown, smooth, cylindrical to geniculate-sinuous, 15-70 x 2.5-4 µm. *Conidiogenous cells*



Figs 1, 2. Conidiophores and conidia of *Stigmina cocculi* and *Pseudocercospora curtisiae* (bar = 10 µm). Fig. 1. *S. cocculi* (PREM 42682). Fig. 2. *P. curtisiae* (PREM 32077).

integrated, smooth, olivaceous brown, polyblastic, sympodial, 10-20 x 2.5-3.5 µm, with unthickened conidial scars. *Conidia* pale olivaceous, smooth, obclavate-cylindrical, guttulate, straight to curved, 3-8-septate, 20-75 x 2.5-4 µm, tapering from a subtruncate, unthickened base to an obtusely rounded apex.

Specimen: Cape Province, Knysna, *Curtisea faginea* (Cornaceae), V. Reinecke, Jan. 1940, PREM 32077, (holotype).

In an examination of the holotype specimen, conidia were observed to be olivaceous without thickened, refractive hila. Furthermore, conidiophores occurred in fascicles on stromata, or singly on superficial hyphae which also colonized leaf hairs, a characteristic more common in *Mycovellosiella*. However, the unthickened conidial hila and conidial scars on the conidiogenous cells place this collection in *Pseudocercospora*.

40. ***curvispora*** *Stigmina* Crous & U. Braun, *Sydowia* **46**: 220 (1994).

Specimen: Eastern Transvaal, Roodeplaat, Vegetable & Ornamental Plant Research Institute, experimental farm, *Rhus pyroides* (Anacardiaceae), E.J. van der Linde, Mar. 1988, PREM 51105 (holotype).

41. ***delicatissima*** *Mycovellosiella* (Kalchbr. & Cooke) U. Braun, *Mycotaxon* **48**: 276 (1993).

Cercospora delicatissima Kalch. & Cooke, *Grevillea* **9**: 24 (1881).
Cercosporella delicatissima (Kalch. & Cooke) Chupp, *Bothalia* **4**: 884 (1948).

Specimen: Cape Province, Somerset East, Sylvis Mt., Boschberg, *Priva meyeri* (Verbenaceae), 1875, MacOwan 1109, PREM 22013 (isotype).

Chupp observed all structures of this fungus to be hyaline, and therefore proposed a new combination in *Cercosporella* (Chupp & Doidge, 1948). However, neither Chupp (1954) nor Pollack (1987), cited this new name when dealing with the species. Braun (1993b) proposed the new combination in *Mycovellosiella* based on the coloured secondary mycelium, and the solitary conidiophores with thickened conidial scars.

42. ***demetrioniana*** *Cercospora* G. Winter, *Hedwigia* **23**: 170 (1884).

Specimens: Transvaal, Barberton, Nelspruit Research Station, *Crotalaria intermedia* (Fabaceae), L.C.C. Liebenberg, 29 Jul. 1931, PREM 25970;

Transvaal, Barberton, Nelspruit Research Station, *Crotalaria juncea*, L.C.C. Liebenberg, Mar. 1931, PREM 26676.

Foreign specimen: USA, Missouri, *Crotalaria sagittalis*, Rabenh.-G. Winter, Fungi Europaei, 1883, PREM 3419.

43. ***dichondrae*** *Mycovellosiella* Crous & U. Braun, *Mycol. Res.* 99: 33 (1995).

Specimen: Transvaal, Louis Trichardt, Clouds End Hotel, *Dichondra repens* (Convolvulaceae), R.Y. Anelich, Apr. 1988, PREM 51116 (holotype).

44. ***diffusum*** *Sirosporium* (Heald & Wolf) Deighton, in Ellis, *More Dematiaceous Hyphomycetes*, p. 299, Kew (1976).

Clasterosporium diffusum Heald & Wolf, *Mycologia* **3**: 21 (1911).
Cercospora fusca Rands, *J. Agr. Res.* **1**: 312-319 (1914).

Foreign specimen: Mozambique, Umbeluzi, *Carya* sp. (Juglandaceae), T. Carvalho, 22 Jun. 1946, PREM 36760.

Although Doidge (1950) reported *Cercospora fusca* to occur in South Africa, no voucher specimen could be traced at PREM.

45. ***diospyri-lycioides*** *Pseudocercospora* Crous & U. Braun, *Mycol. Res.* 99: 32 (1995).

Specimen: Transvaal, Pretoria, Roodeplaat Experimental Farm, Vegetable & Ornamental Research Institute, *Diospyros lycioides* var. *lycioides* (Ebenaceae), E.J. van der Linde, Mar. 1988, PREM 51106 (holotype).

46. ***dissiliensis*** *Phaeoramularia* (Duby) Deighton, in Ellis, *More Dematiaceous Hyphomycetes*, p. 324, Kew (1976).

Torula dissiliens Duby, *Mem. Soc. Phys. Hist. nat. Geneve* **7**: 128 (1835).
Septocylindrium dissiliens (Duby) Sacc., *Mycotheca veneta* p. 583 (1876).
Cladosporium roesleri Cattaneo, *Bolm Com. agrar. Voghera* **13**: 263 (1876).
Cercospora roesleri (Cattaneo) Sacc., *Michelia* **2**: 128 (1880).
Cercospora coryneoides Savulescu & Rayss, *Rev. Path. Veg. Entomol. Agr. Fr.* **22**: 223 (1935).
Ragnhildiana roesleri (Cattaneo) Vassiljevskiy, in Vassiljevskiy & Karakulin, *Fungi imperfecti parasitici*, **1**: 375 (1937).
Septosporium fuckelii Thüm., *Ost. bot. Z.* **27**: 137 (1877).
Cercospora fuckelii (Thüm.) Jaczewski, *Parasitic fungal diseases of grape vine, ed.* **2**: 81 (1906).
Isariopsis fuckellii (Thüm.) du Plessis, *Fmg. S. Afr.* **17**: 62 (1942).
Cercospora roesleri forma *fuckelii* (Thüm.) Elenkin, *Bol. Rast. (Morbi Plant.)* **4**: 68 (1909).

Cladosporium pestis Thüm., *Ost. bot. Z.* **27**: 12 (1877).
Cercospora leoni Savul. & Rayss, *Rev. Path. Veg. Entomol. Agr. Fr.* **22**: 222 (1935).
Cercospora corynelioides Savul. & Rayss, *Rev. Path. Veg. Entomol. Agr. Fr.* **22**: 223 (1935).
Cercospora judaica Rayss, *Palest. J. Bot. J. Ser. III.* **50**: 22 (1943).
? *Septocylindrium virens* Sacc., *Nuovo G. Bot. Ital.* **8**: 186 (1876).

Specimens: Cape Province, Upington, *Vitis vinifera* (Vitaceae), Hugo, 31 Mar. 1941, PREM 33155; Cape Province, Upington, *V. vinifera*, S.J. Du Plessis, Apr. 1941, (Stell. 1046), PREM 46968, (Stell. 1045), PREM 46967; Cape Province, Kakamas District, *V. vinifera*, O. Valentin, 22 Mar. 1943, PREM 33893.

47. *dissotidis Pseudocercospora* (Chupp & Doidge) Crous & U. Braun comb. nov. Fig. 3.

Cercospora dissotidis Chupp & Doidge, *Bothalia* **4**: 884 (1948).

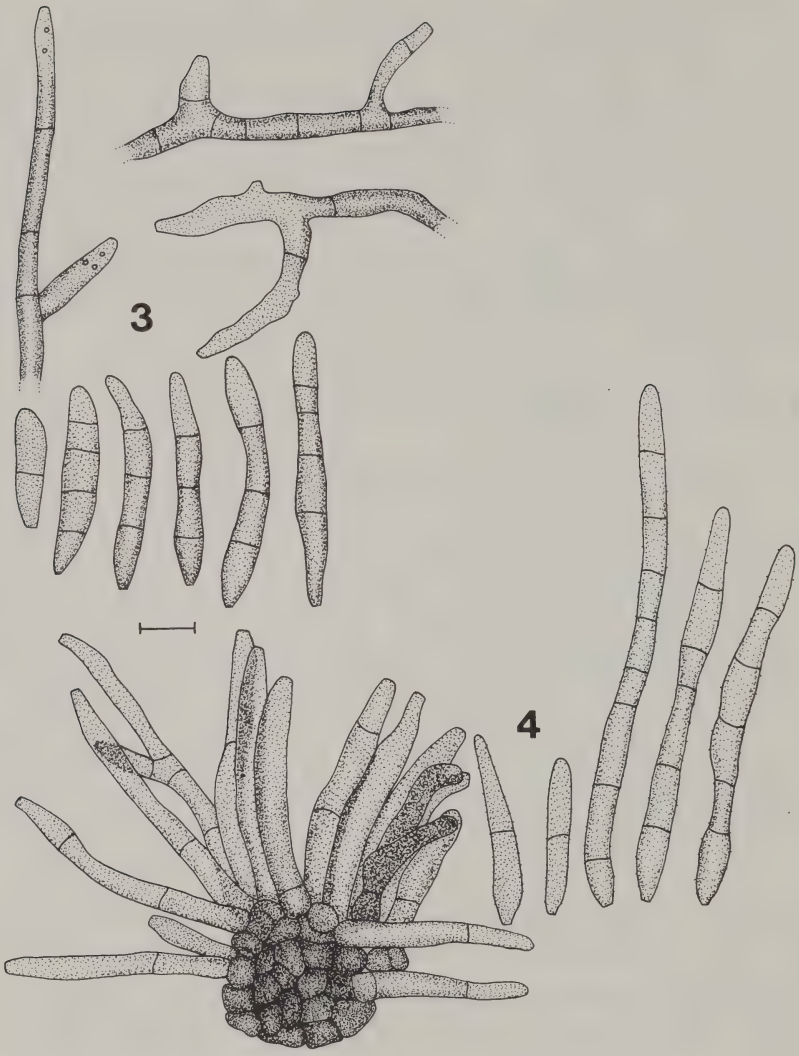
Leaf spots absent or indistinct. *Mycelium* internal and external: primary mycelium internal, hyaline, smooth, branched, septate, 2.5-3 µm diam.; secondary mycelium superficial, frequently around the base of leaf hairs, brown, smooth, septate, branched, 4-5 µm diam. *Conidiophores* situated on secondary hyphae, solitary, olivaceous brown, smooth, cylindrical, 1-4-septate, 10-150 x 4-6 µm. *Conidiogenous cells* terminal, smooth, brown, 5-20 x 4-6 µm with slightly refractive conidial scars on older, shrunken conidiophores. *Conidia* olivaceous, brown, smooth, solitary, subcylindric, straight to mildly curved, 1-5-septate, with a bluntly rounded apex and long obconical base, 20-65 x 4.5-6 µm.

Specimen: unknown location in South Africa, A.O.D. Mogg, *Dissotis incana* (Melastomataceae), PREM 11651 (holotype).

48. ***doidgei Pseudocercospora*** **Crous & U. Braun sp. nov.**

Etym.: named after the collector Dr. Ethel M. Doidge. Fig. 4.

Maculae amphigenae, atro-brunneae, angulares, 2-3 mm diam., *Mycelium* immersum, laevia, rumosae, hyalinae vel pallide olivaceae, 2.5-3.5 µm diam. *Caespituli* hypophylli. *Stromata* immersa, brunnea, - 90 x 120 µm. *Conidiophora* dense fasciculata, divergentia, simplicia vel ramosa, cylindrica vel leniter geniculata-sinuosa, 40-100 x 4-6 µm, 1-5-septata. *Cellulae conidiogenae* terminaliae, olivaceae, laeviae, cylindricae, ad apicem attenuatae, subtruncatae, mono- vel



Figs 3, 4. Conidiophores and conidia of *Pseudocercospora dissotidis* and *P. doidgei* (bar = 10 µm). Fig. 3. *P. dissotidis* (PREM 511651). Fig. 4. *P. doidgei* (PREM 1671).

polyblasticae, 20-35 x 4-5 µm; cicatrices conidiales inconspicuae. *Conidia* solitaria, olivaceo-brunnea, laevia vel lenissime verruculosa, 1-8-septata, recta vel leniter curvata, subcylindrica, ad apicem rotundata, basi in hilum attenuata, truncata, non incrassata, 25-95 x 5-6 µm.

Leaf spots amphigenous, dark brown, angular, 2-3 mm diam., more clearly delimited on lower leaf surface. *Mycelium* internal, hyphae smooth, branched, hyaline to pale olivaceous, 2.5-3.5 µm diam. *Caespituli* hypophyllous, originating from a well-developed, immersed, brown stroma, up to 90 µm wide and 120 µm high. *Conidiophores* fasciculate, dense, strongly divergent, simple or branched, cylindrical, slightly geniculate-sinuous, medium brown, smooth, 40-100 x 4-6 µm, 1-5-septate. *Conidiogenous cells* terminal, olivaceous, smooth, cylindrical, tapering to a subtruncate apex, mono- to polyblastic, conidial scars inconspicuous, 20-35 x 4-5 µm. *Conidia* solitary, olivaceous-brown, smooth to slightly verruculose, 1-8-septate, straight to slightly curved, subcylindrical with an obtuse apex and obconically truncate, unthickened base, 25-95 x 5-6 µm.

Specimens: Natal, Durban, Bluff, *Trema orientalis* (Ulmaceae), E.M. Doidge, 7 Jul. 1911, PREM 1671 (holotype); Natal, Kwambonambi, *T. orientalis*, M.J. Wingfield, Oct. 1994, PREM 51833.

Chupp (1954) reported *Cercospora tremae* (Stev. & Solh.) Chupp to occur in South Africa. However, in an examination of the specimen (PREM 1671), some important discrepancies were found. The caespituli originate from stromata, and are always hypophyllous. Furthermore, conidia have more septa, are larger, and not catenulate. Several cercosporoid fungi have been described from *Trema* spp. (Pollack, 1987). The South African collection can be distinguished from *Pseudocercospora trematis-cannabini* (Yen & Lim.) Deighton by having branched conidiophores, and the absence of epiphyllous fruiting. It is distinct from *P. kiagweensis* Deighton (= *Cercospora trematis* Hansf.) in having fasciculate conidiophores with well developed stromas, and definite lesions. The presence of stromata also distinguishes it from *P. trematicola* (Yen) Deighton (= *Cercospora trematis-guineensis* Yen & Gilles). The South African collection is most similar to *P. trematis-orientalis* (Sun)

Deighton, but has larger stromata, only hypophyllous fruiting, larger conidiophores, and wider conidia.

49. ***dombeyae*** *Mycovellosiella* Crous & U. Braun, *Sydowia* **46**: 212 (1994).

Specimens: Transvaal, Louis Trichardt, Hangklip Forestry Station, *Dombeya burgessiae* (Sterculiaceae), R.Y. Anelich, Apr. 1988, PREM 51129 (holotype); PREM 51128 (paratype).

50. ***dovyalidis*** *Pseudocercospora* (Chupp & Doidge) Deighton, *Mycol. Pap.* **138**: 99 (1975).
Cercospora dovyalidis Chupp & Doidge, *Bothalia* **4**: 885 (1948).
Pseudocercosporella dovyalidis (Chupp & Doidge) B. Sutton, *Mycol. Pap.* **138**: 99 (1975).

Specimens: Transvaal, Pretoria, Groenkloof, *Dovyalis zeyheri* (Sond.) Warb. (Flacourtiaceae), E.M. Doidge, 18 Feb. 1914, PREM 7398 (holotype); Transvaal, Witbank, Loskopdam, *Dovyalis zeyheri*, W.F.O. Marasas, Apr. 1965, PREM 43030.

51. ***dubia*** *Passalora* (Riess) U. Braun, *Mycotaxon* **54**: in press (1995).
Ramularia dubia Riess, *Hedwigia* **1**: Pl. 4, Fig. 9 (1854).
Cercospora chenopodii Fresen., *Beitr. Mykol.*, p. 92 (1863).
Cercospora dubia (Riess) G. Winter, *Fungi eur., ed. nov., cent.* **28**, No. 2780, Dresden 1882, non *C. dubia* Speg. (1880).
Cercosporidium dubium (Riess) Liu & Guo (1982: 95).

Specimens: Western Cape, Stellenbosch, Vredenburg Farm, *Chenopodium album* (Chenopodiaceae), M.J. Morris, 14 May 1990, PREM 51700; Eastern Cape, Hankey, *C. album*, M.J. Morris, 8 Nov. 1990, PREM 51701.

52. ***echii*** *Cercospora* G. Winter, *Hedwigia* **23**: 190 (1884).

Specimen: Western Cape, Stellenbosch, Vredenburg Farm, *Echium plantagineum* (Boraginaceae), M.J. Morris, 19 Apr. 1993, PREM 51702.

53. ***egenula*** *Paracercospora* (Syd.) Deighton, *Mycol. Pap.* **144**: 48 (1979).
Cercospora egenula Syd., *Ann. Mycol.* **33**: 885 (1935).
Cercospora egenula (Syd.) Chupp & Doidge, *Bothalia* **4**: 885 (1948).
Cercospora solani-melongenae Chupp, *Bothalia* **4**: 892 (1948).

Specimens: Transvaal, Barberton, Nelspruit Research Station, *Solanum panduraeforme* (Solanaceae), L.C.C. Liebenberg, May 1931, PREM 25999 (holotype); Natal, Cavendish, *Solanum melongena* var. *esculentum*, V.A. Wager, 29 Jul. 1942, PREM 34107.

54. *ekebergiae* *Cercosporella* Syd., *Ann. Mycol.* **12**: 267 (1914).

Specimen: Natal, Verulan, *Ekebergia* sp. (Meliaceae), Pole-Evans, 3 Jul. 1913 (S).

According to Braun (1991), this specimen represents a fungus with acervular conidiomata, suggesting a generic placement in *Phloeospora* Wallr. or *Phloeosporella* Höhn. to be more appropriate.

55. *eucalyptorum* *Pseudocercospora* Crous, M.J. Wingf., Marasas & B. Sutton, *Mycol. Res.* **93**: 394-395 (1989).

Pseudocercospora eucalypti Goh & W.H. Hsieh, *Cercospora and similar fungi from Taiwan* p. 244 (1990).

Specimens: Cape Province, Stellenbosch, *Eucalyptus nitens* (Deane et Maid.) Maid. (Myrtaceae), P.W. Crous, Aug. 1988, PREM 49112 (holotype); Cape Province, Knysna, *E. nitens*, M.J. Wingfield, Apr. 1988, PREM 49111; Cape Province, Stellenbosch, *E. nitens*, 1988, CUP 62013, IMI 331472, 331473.

The type specimens of *Cercospora eucalypti* Cooke & Massee *apud* Cooke, and *Cercospora epicoccoides* Cooke & Massee *apud* Cooke did not represent cercosporoid fungi. Crous *et al.* (1989) found that they represented species of a coelomycete genus, *Phaeoseptoria* Speg. In a later study, Walker *et al.* (1992) erected a new genus, *Kirramyces* Walker, B. Sutton & Pascoe, and established new combinations for *C. eucalypti* and *C. epicoccoides* in *Kirramyces*.

Hsieh & Goh (1990) described a new species of *Pseudocercospora* from *Eucalyptus*, *P. eucalypti* Goh & W.H. Hsieh, the type specimen of which could not be located for examination in this study. From the similar description of the latter fungus, we, conclude that *P. eucalypti* is a synonym of *P. eucalyptorum*.

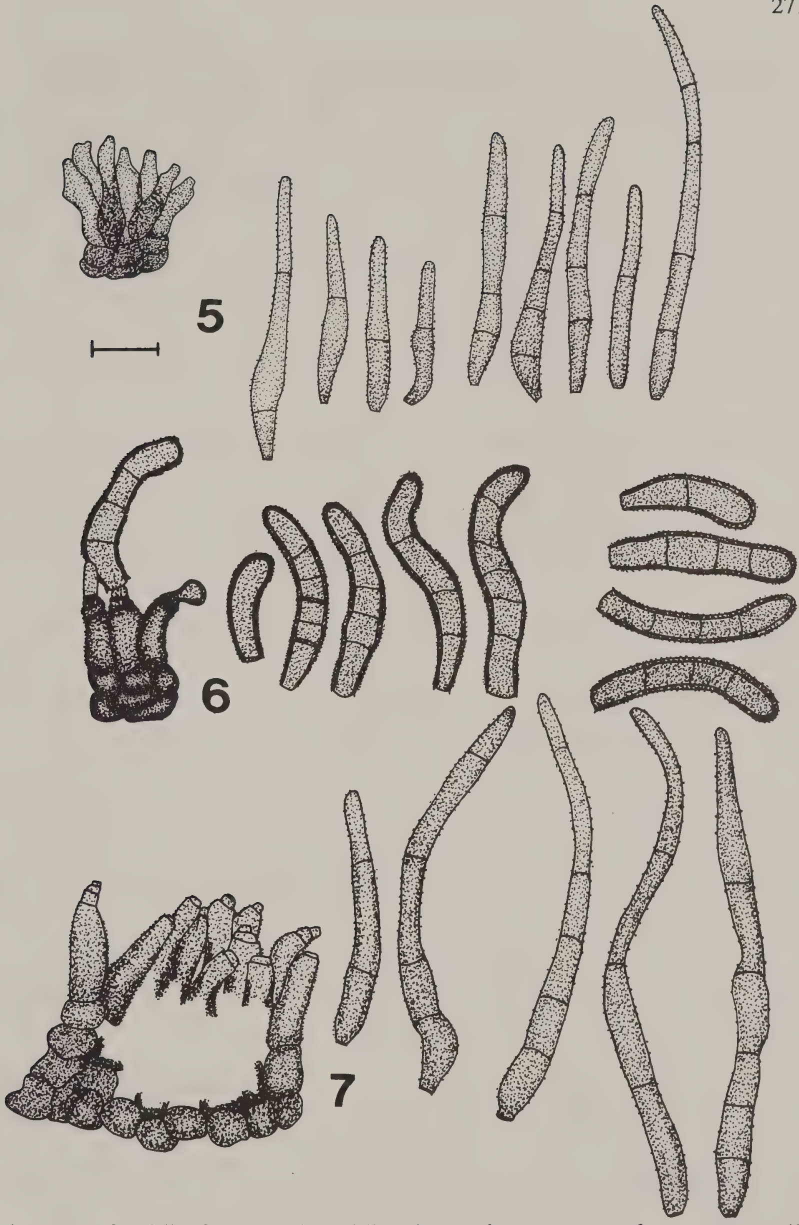
Kobayashi (1984) described an additional species, *C. paraguayensis* Kobayashi, from *Eucalyptus* leaves in Paraguay. An examination of the type lodged at TFM Herbarium in Japan (FPH-5626) confirmed it to be a species of *Pseudocercospora*. Conidia are (1-)3(-6)-septate, 40-70 x 2.5-4.5 µm, like those of *P. eucalyptorum*. However, unlike *P. eucalyptorum*, the fascicles do not arise from a well-developed stroma. The fungus from Paraguay is therefore not considered as synonymous with *P. eucalyptorum*, and the following new combination is proposed: *Pseudocercospora paraguayensis* (Kobayashi) Crous comb. nov., [*Cercospora paraguayensis* Kobayashi, *Trans. mycol. Soc. Japan* **25**: 263 (1984), bas.].

56. *fici-sycamorusii Pseudocercospora* Crous & U. Braun sp. nov. Fig. 5.

Maculae amphigenae, orbiculares vel ovales, pallide brunneae, 5-15 mm diam., margine diffuso cinctae. *Mycelium* primarium internum, mycelium secundarium externum: hyphae ramosae, septatae, laeviae, hyalinae vel olivaceae, 2-2.5 µm latae. *Stromata* 35-50 x 25-35 µm, olivacea. *Caespituli* hypophylli, brunnei, 35-70 x 25-36 µm. *Conidiophora* (= cellulae conidiogenae) numerosa, dense fasciculata, olivacea, laevia, cylindrica, basi incrassata vel ad apicem irregulares, recta vel interdum percurrentes, 10-20 x 3-4 µm. *Cicatrices* conidiales inconspicuae, non incrassatae. *Conidia* solitaria, olivacea, lenissime verruculosa, anguste obclavata, ad apicem obtusa, basi in hilum attenuata, truncata, non incrassata, recta vel leniter curvata, (1-)3(-4)-septata, 20-60 x 3-3.5 µm.

Leaf spots amphigenous, circular to oval with diffuse margins, light brown, 5-15 mm in diam. *Mycelium* internal and external: internal hyphae hyaline to olivaceous, giving rise to olivaceous stromata, 35-50 µm wide, 25-35 µm high; external hyphae branched, septate, smooth, hyaline to olivaceous, 2-2.5 µm diam. *Caespituli* hypophyllous, brown, 35-70 µm wide, 25-35 µm high. *Conidiophores* numerous, in fairly dense fascicles, reduced to conidiogenous cells. *Conidiogenous cells* olivaceous, smooth, cylindrical with a swollen base, or irregular at the apex, straight to geniculate-sinuous, mono- to polyblastic, sympodial, or occasionally proliferating once or twice percurrently, 10-20 x 3-4 µm, conidial scars unthickened, inconspicuous. *Conidia* solitary, olivaceous, finely verruculose, narrowly obclavate with an obtuse apex and a long obconically truncate base with an unthickened hilum, straight or slightly curved, (1-)3(-4)-septate, 20-60 x 3-3.5 µm.

Specimen: Transvaal, Schagen, Nelspruit, *Ficus sycamorus* (Moraceae), L.C.C. Liebenberg, Apr. 1932, PREM 26345 (holotype).



Figs 5-7. Conidiophores and conidia of *Pseudocercospora fici-sycamorusii*, *Stigmina knoxdaviesii* and *Cercostigmina liebenbergii* (bar = 10 µm). Fig. 5. *P. fici-sycamorusii* (PREM 26345). Fig. 6. *S. knoxdaviesii* (PREM 26353, vertical conidia), (PREM 6618, horisontal conidia). Fig. 7. *C. liebenbergii* (PREM 30964).

Chupp & Doidge (1948) reported *Pseudocercospora fici* (Heald & Wolf) Liu & Guo (= *Cercospora fici* Heald & Wolf) to occur in South Africa. However, they found the conidia to be shorter than those of the type collection. In an examination of the South African collection (PREM 26345), we found it to represent a *Pseudocercospora* species. This collection could be distinguished from the species listed by Pollack (1987) on *Ficus*. Although the South African collection proved to be similar to *P. fici-caricae* (Sawada) Goh & W.H. Hsieh, it could be distinguished by its non-septate conidiophores, which do not occur separately on secondary mycelium.

57. ***formosana*** *Pseudocercospora* (Yamamoto) Deighton, *Mycol. Pap.* **140**: 144 (1976).

Cercospora formosana Yamamoto, *J. Soc. Trop. Agr.* **6**: 600 (1934).
Cercospora lantana-aculeatae Yen, *Rev. Mycol.* **31**: 124 (1966).
Pseudocercospora lantana-aculeatae (Yen) Yen, *Bull. Soc. Mycol. Fr.* **96**: 33 (1980).

Specimen: Natal, Margate, *Lantana camara* (Verbenaceae), C.J. Cilliers, 12 Sept. 1979, PREM 45910.

58. ***fusimaculans*** *Phaeoramularia* (G.F. Atk.) Liu & Guo, *Acta Phytopathol. Sin.* **12**: 9 (1982).

Cercospora fusimaculans G.F. Atk., *J. Elisha Mitchell Sci. Soc.* **8**: 50 (1892).
Cercospora fusimaculans G.F. Atk. *emend* Kranz, *Sydowia* **19**: 8 (1965).
Cercospora panici Davis, *Wisc. Acad. Trans.* **19**: 714 (1919).
Cercospora panici-miliacei Sawada, *Formosa Agr. Res. Inst. Rep.* **51**: 131 (1931).
Cercosporina panici (Davis) Sacc., *Syll. Fung.* **25**: 904 (1931).

Specimen: Transvaal, Pretoria, Kaalfontein, *Brachiaria serrata* (Poaceae), Pole Evans, 27 Mar. 1917, PREM 10081.

Foreign specimen: ?, *Rottboellia exaltata*, S.J. Hughes, 2 Jul. 1949, PREM 41098, IMI 39661.

59. ***gossypina*** *Cercospora* Cooke, *Grevillea* **12**: 31 (1883).

Holomorph: *Mycosphaerella gossypina* (G.F. Atk.) Earle, *Exp. Sta. Bull.*, **107**: 309 (1900).
Sphaerella gossypina G.F. Atk., *Bull. Torrey Bot. Club* **18**: 300-301 (1891).
Mycosphaerella gossypina (G.F. Atk.) Siemas., *Mater. Mikol. Fitopatol. Rossi* **1**: 26 (1915).

Mycosphaerella gossypina (G.F. Atk.) Jacz. *Opredelitel'gribov* **2**: 619 (1923).
Mycosphaerella gossypina (G.F. Atk.) Woron., *Trudy Tiflissk. Bot. Sada 23*, **3**: 137 (1923).
Mycosphaerella gossypina (G.F. Atk.) Cif. & Mont., in Ciferri, *Quaderno* **19**: 233 (1961).

Specimens: Cape Province, *Gossypium* sp. (Malvaceae), C.N. Mally, Feb. 1911, PREM 1206; Transvaal, Pretoria, Skinner's Court, *Gossypium* sp., Pole Evans, 5 Jan. 1906, PREM 799 (specimens depauperate).

Foreign specimen: USA, Texas, *Gossypium* sp., D.A. Saunders, 16 Sept. 1913, PREM 46168.

60. ***gossypii*** *Ramulariopsis* (Speg.) U. Braun, *Nova Hedwigia* **56**: 432 (1993).

Cercosporella gossypii Speg., *Ann. Soc. Cient. Argent.* **22**: 208 (1886).
Ramularia areolata G.F. Atk., *Bot. Gaz.* **15**: 168 (1890).
Septocylindrium areolatum (G.F. Atk.) Pounds & Clem., *Minn. Bot. Stud.* **1**: 651 (1896).
Symphyrosita areolata (G.F. Atk.) Sawada, *Spec. Publ. Coll. Agric. Nat. Taiwan Univ.* **8**: 232 (1959).
Ramularia gossypii (Speg.) Cif., *Atti. Ist. Bol. Univ. Pavia, Ser. 5*, **19**: 24 (1961).
Septocylindrium gossypii (Speg.) Subramanian, *Hyphomycetes,* p. 309, New Delhi (1971).

Specimens: Transvaal, Komatidraai, *Gossypium* sp. (Malvaceae), N. Basson, 13 Apr. 1978, PREM 45347; Limpopo Valley, *Gossypium* sp., M.C. Dippenaar, Apr. 1978, PREM 45346; Umbeluzi, *Gossypium transvaalense*, P. Talbot, 26 Jul. 1946, PREM 36750.

Foreign specimens: USA, Alabama, Tallassee, *Gossypium herbaceum*, W.A. Orton, 8 Sept. 1905, PREM 46161; USA, South Carolina, Florence, *Gossypium* sp., W.A. Orton, Sept. 1910, PREM 46160; Swaziland, *Gossypium* sp., PREM 7471.

61. ***graminis*** *Passalora* (Fuckel) v. Höhn., *Zbl. Bakt. ParasitKde, Abt. 2,* **60**: 6 (1923).

Scolicotrichum graminis Fuckel, *Symbol. Mycol.* p. 107 (1870).
Cercospora graminis (Fuckel) Horsfall, *Mem. Cornell Univ. Agric Exp. Stn.* **130**: 100 (1930).
Cercosporidium graminis (Fuckel) Deighton, *Mycol. Pap.* **112**: 62 (1967).

Specimens: Natal, Himeville, *Dactylis glomerata* (Poaceae), S.G. Truter, 11 May 1950, PREM 39116, 39115; Orange Free State, Marseilles, *D.*

glomerata, S.J. Truter, Jul. 1950, PREM 39129; Natal, Himeville, *D. glomerata*, Jan. 1950, PREM 39017; Natal, Himeville, *D. glomerata*, S.J. Truter, Oct. 1949, PREM 39198.

Foreign specimen: Petrak, Mycotheca Generalis, Sweden, *Milium effusum*, A.G. Eliasson, Sept. 1926, PREM 37207.

Von Arx (1983), Castañeda & Braun (1989) and Deighton (1990) regard the genus *Cercosporidium* as a synonym of *Passalora*. The older combination in *Passalora*, *P. graminis* (Fuckel) Höhn., is therefore accepted for this species.

62. ***granuliformis*** *Cercospora* Ellis & Holway, *J. Mycol.* **1**: 6 (1885).

Cercospora sororiae Tehon, *Mycologia* **40**: 323 (1948).

Specimen: Cape Province, Cape Town, *Viola odorata* (Violaceae), C.W. Mally, 6 Mar. 1903, PREM 6963 (specimen depauperate).

Foreign specimens: Ellis & Everh., Fungi Colombiani, Nuttallburg, West Va., *Viola cucullata,* L.W. Nuttal, Jul. 1894, PREM 49957; Rabenh.-G. Winter, Fungi Europaei, USA, Missouri, *Viola* sp., C.H. Dematrio, PREM 4023a, & Manhattan Kansas, W.A. Kellerman, PREM 4023b.

The herbarium sheet notes that this disease was common in the Cape Town municipal garden.

63. ***grevilleana*** *Ramularia* (Tul. & C. Tul.) Joerst., *Meed. Stat. Plantepatol. Inst.* **1**: 17 (1945).

Cylindrosporium grevilleanum Tul. & C. Tul., *Selecta fungorum Carpologica* **2**: 288, Paris (1863).
Ramularia fragariae Peck, *Ann. Rep. N. Y. State Mus.* **32**: 43 (1879).
Ramularia tulasnei Sacc., *Fungi ital. tab.* 1006 (1881).
Ramularia tulasnei var. *fragariae-vescae*, C. Massal., *Osserv. fitol.* in *Madonna Verona* **2**: 9 (1908). *R. brunnea auct.*, *non* Peck.
Holomorph: *Mycosphaerella fragariae* (Tul.) Johanson *ex* Oudem., *Rév. Champ. Pays-Bas* **2**: 216 Mar. (1897).
Sphaeria fragariae Tul., *Ann. Sci. Nat. Ser.* **4**, 5: 112 (1856).
Sphaeria fragariae (Tul.) Sacc., *Syll. Fung.* **1**: 505 (1882).
Mycosphaerella fragariae (Tul.) Lind. in Engler & Prantl., *Nat. Pflanzenf.* **1**: 424 Jun. (1897).
Mycosphaerella fragariae (Tul.) Felt., *Recueils Mém. Trav. Soc. Bot. Luxembourg* **14**: 286 (1899).
Mycosphaerella fragariae (Tul.) Strass., *Ann. Mycol.* **9**: 87 (1911).
Mycosphaerella fragariae (Tul.) Staritz, *Verh. Bot. Vereins Prov. Brandenburg* **55**: 74 (1913).

Mycosphaerella fragariae (Tul.) Höhn., *Sitzungsb. Kaiserl. Wiss. Math.-Naturwiss. Kl. Abt. 1*, **125**: 93 (1916).
Mycosphaerella fragariae (Tul.) Cruchet, *Bull. Soc. Vaud. Sci. Nat.* **55**: 45 (1923).
Mycosphaerella fragariae (Tul.) Jorstad, *Meed. Stat. Plantepatol. Inst.* **1**: C17 (1945).

Specimen: Western Cape, Stellenbosch, *Fragaria* sp. (Rosaceae), P.W. Crous, Sept. 1993, PREM 51720.

Foreign specimens: USA, Ohio, Columbus, *Fragaria vesca,* C.M. Weed, 13 Oct. 1982, PREM 19776; Krieger, Schädliche Pilze, *Fragaria* sp., Krieger, PREM 21904.

The teleomorph has been reported from South Africa. This is the first local record of the *Ramularia* anamorph.

64. ***grewiae-occidentalis*** *Ramularia* Crous & U. Braun, *Mycol. Res.* **99**: 34 (1995).

Specimen: Natal, Donnybrook, Nxumeni Forestry Station, *Grewia occidentalis* var. *occidentalis* (Tiliaceae), R.Y. Anelich, May 1988, PREM 51123 (holotype).

65. ***griseola*** *Phaeoisariopsis* (Sacc.) Ferr., *Ann. Mycol.* **7**: 273 (1909).

Isariopsis griseola Sacc., *Michelia* **1**: 273 (1878).
Graphium laxum Ellis, *Bull. Torrey Bot. Club* **8**: 64-66 (1881).
Pseudocercospora columnaris (Ellis & Everh.) Yen, in Yen & Lim, *Gardens' Bull., Singapore* **33**: 172 (1980).
Cercospora columnaris Ellis & Everh., *Proc. Acad. Nat. Sci. Phila.* **46**: 380 (1894).
Arthrobotryum puttemansii Henn., *Hedwigia* **41**: 309 (1902).
Cercospora stuhlmannii Henn., *Engl. Bot. Jahrb.* **33**: 40 (1904).

Specimens: Transvaal, Pretoria, *Phaseolus vulgaris* (Fabaceae), E.M. Doidge, Apr. 1918, PREM 11387; Natal, Winkel Spruit, *P. vulgaris*, E.M. Doidge, 6 Jul. 1912, PREM 2504; Transvaal, Barberton, *P. vulgaris*, J.W. Watts, 14 Apr. 1906, PREM 15; Transvaal, Potchefstroom, *P. vulgaris*, PREM 23497; Natal, Cedara, *P. vulgaris*, R.R. Staples, 19 Apr. 1922, PREM 15428; Natal, Winkelspruit, *P. vulgaris*, J.B. Pole Evans, 5 Jun. 1912, PREM 2387.

Local specimens labelled *Cercospora phaseolina* Speg. proved to be representative of *P. griseola*.

66. *haemanthi* *Cercospora* Kalchbr., *Grevillea* **9**: 24 (1881).

Specimens: Cape Province, *Haemanthus puniceus* (Amaryllidaceae), MacOwan 1020 (holotype, not located); Transvaal, Pretoria, *H. magnificus*, Pole Evans, Feb. 1911, PREM 1203; Transvaal, Pretoria, Grootfontein, *H. magnificus*, E.M. Doidge, 11 Apr. 1911, PREM 1378; Natal, Pietermaritzburg, Mountain Rise, *H. natalensis*, E.M. Doidge, 23 Mar. 1916, PREM 7867; Cape Province, Umtata, *H. puniceus*, A. Pegler, 6 May 1916, PREM 9738; Cape Province, Kentami, *H. puniceus*, A. Pegler, 31 May 1916; Transvaal, Rustenburg, Buffelspoort, E.M. Doidge, 16 Apr. 1936; PREM 28615; Transvaal, Pretoria, Derdepoort, *H. magnificus*, E.M. Doidge & A.M. Bottomley, 4 Feb. 1943, PREM 33933.

67. *halleriae* *Pseudocercospora* (Chupp & Doidge) Deighton, *Mycol. Pap.* **140**: 145 (1976).
Cercospora halleriae Chupp & Doidge, *Bothalia* **4**: 886 (1948).

Specimen: Transvaal, Barberton, *Halleria lucida* (Scrophulariaceae), P.A. van der Bijl, 16 Oct. 1913, PREM 7377 (holotype).

A characteristic not mentioned in the original description of this taxon is that the conidiogenous cells can proliferate either sympodially, or once or twice percurrently.

68. *handelii* *Pseudocercospora* (Bubák) Deighton, *Trans. Br. mycol. Soc.* **88**: 390 (1987).
Cercospora handelii Bubák, *Annln. naturhist. Hofmus. Wien* **23**: 106 (1909).
Cercoseptoria handelii (Bubák) Deighton, *Mycol. Pap.* **140**: 166 (1976).

Specimen: Transvaal, White River, *Rhododendron* sp. (Ericaceae) P.W. Crous, Jul. 1990, PREM 51295.

Foreign specimen: Australia, NSA, Turramurra, 15 Trentino Rd., *Rhododendron* sp., O.M. Williams, 28 Sept. 1969, PREM 45237.

69. *helianthi* *Cercospora* Ellis & Everh., *J. Mycol.* **3**: 20 (1887).

Gorter (1977) reported this species on *Helianthus* (Asteraceae) in South Africa. No material could be located at PREM.

70. *henningsii* *Passalora* (Allesch.) Castañeda & U. Braun, *Crypt. Bot.* **1**: 46 (1989).
Cercospora henningsii Allesch. in Engl., *Pfanzenwelt Ostaftikas, Teil C*: 35 (1895).
Cercospora cassavae Ellis & Everh., *Bull. Torrey Bot. Club* **22**: 438 (1895).

Cercospora manihotis P. Henn., *Hedwigia* **41**: 18 (1902).
Cercospora cearae Petch, *Ann. Roy. Bot. Gard. Peradeniya* **3**: 10 (1910).
Septogloeum manihotis Zimm., *Centralbl. f. Bakt. Abt. 2*. **8**: 218 (1902).
Helminthosporium manihotis Rangel, *Arch. Jard. Bot. Rio de Janeiro* **2**: 71 (1902).
Cercosporidium henningsii (Allesch.) Deighton, in Ellis, *More Dematiaceous Hyphomycetes*, p. 295, Kew (1976).
Holomorph: *Mycosphaerella henningsii* Sivanesan, *Trans. Br. mycol. Soc*. **84**: 552 (1985).
Mycosphaerella manihotis Ghesq. & Henr. (1924), non *M. manihotis* Syd..& P. Syd.

Specimen: Natal, Makatina Flats, *Manihot esculenta* (Euphorbiaceae), E.O.K. Richards, 18 Feb. 1980, PREM 45576.

Foreign specimens: Mycoflora Domingensis N. 12, *Manihot utilissima*, R. Ciferri, 15 Aug. 1930; Africa, Uganda, *M. utilissima*, R.Q. Dümmr, Jan. 1915, PREM 11961.

71. *heraclei Ramularia* (Oudem.) Sacc., *Fungi ital.*, tab. 1008 (1881).

Ramularia heraclei var. *apii-graveolentis* Sacc. & Berl., *Malpighia* **2**: 247 (1888).

Specimen: South Africa: Natal, Cedara, *Apium graveolens* var. *dulce* (Apiaceae), 1 Jun. 1912, PREM 2099.

This is the first record of this species from South Africa, where it occurs in mixed infections with *Pseudocercosporella pastinacae*.

72. *herpotrichoides Ramulispora* (Fron) von Arx, *Proc. K. ned. Akad. Wet.* 86: 36 (1983).

Cercosporella herpotrichoides Fron, *Ann. Sci. Nat. Agron. Fr. IV*, **1**: 11 (1912).
Pseudocercosporella herpotrichoides (Fron) Deighton, *Mycol. Pap.* **133**: 46 (1973).
Holomorph: *Tapesia yallundae* Wallwork & Spooner, *Trans. Br. mycol. Soc*. **71**: 703 (1988).

Specimen: Cape Province, Jongensklip, *Triticum aestivum* (Poaceae), G.J.M.A. Gorter, 14 Oct. 1942, PREM 46970.

This is a common pathogen of wheat in the Swartland and Koeberg areas of the western Cape Province. Only the W-type (*R. herpotrichoides* var. *herpotrichoides*) has been found.

73 *heteromalla* *Cercospora* Syd., *Ann. Mycol.* **22**: 433 (1924).

Although this fungus was originally described from South Africa, no material could be located at PREM, B or S. The collection data is given as Transvaal, Houtbas, *Rubus rosaefolius* (Rosaceae), July 1924, PREM 34286 (holotype). According to the notes of Ellis (1976), this is probably a species of *Pseudocercospora.*

74. *hypoestis* *Cercosporella* Hansf., *Proc. Linn. Soc. Lond.* **158**: 49 (1947).

Specimen: Northern Transvaal, Louis Trichardt, Hangklip Forestry Station (entrance), *Hypoestes forskalii* (Acanthaceae), R.Y. Anelich, Apr. 1988, PREM 51107.

75. *insulana* *Cercospora* Sacc., *Nuov. Giorn. Bot. Ital. n.s.* **22**: 74 (1915).

Cercosporina insulana Sacc., *Nuov. Giorn. Bot. Ital. n.s.* **22**: 74 (1915).
Cercospora staticis Lobik, *Bolezni Rast.* **17**: 195 (1928).
Cercospora insulana (Sacc.) Vass. in Vassiljevskiy & Karakulin, *Fungi imperfecti parasitici* **1**: 319 (1937).
Cercospora insulana (Sacc.) Chupp, *Bothalia* **4**: 886 (1948).
Cercospora insulana (Sacc.) Muller & Chupp, *Ceiba* **1**: 174 (1950).

Specimens: Transvaal, Nelspruit, *Limonium sinuatum* (Plumbaginaceae), V.A. Wager, 9 Sept. 1927, PREM 22386; Transvaal, Pretoria, *L. sinuatum*, V.A. Wager, 14 Apr. 1927, PREM 21247; Transvaal, Louis Trichardt, *Statice* sp., E.C. Koker, 26 Mar. 1933, PREM 26652.

76. *jussiaeae* *Pseudocercospora* (G.F. Atk.) Deighton, *Mycol. Pap.* **140**: 146 (1976).

Cercospora jussiaeae G.F. Atk., *J. Elisha Mitchell Sci. Soc.* **8**: 50 (1982).

Specimen: Transvaal, Barberton, Nelspruit, *Jussiaea suffructicosa* v. *angustifolia* (Onagraceae), L.C.C. Liebenberg, May 1931, PREM 26066.

77. *kellermanianum* *Cladophialophora* (Marasas & Bredell) U. Braun & U. Feiler, *Microbiol. Res.*: in press (1995).

Phaeoramularia kellermaniana Marasas & Bredell, *Bothalia* **11**: 217 (1974).

Specimens: Cape Province, Kapgat, Calvinia, *Triticum aestivum* L. (Poaceae), Feb. 1972, PREM 44703 (holotype); Cape Province, Oudtshoorn, *Medicago sativa* L., Jul. 1970, PREM 44704 (paratype).

78. ***kiggelariae*** *Pseudocercospora* (Syd.) Crous & U. Braun, *Sydowia* **46**: 215 (1994).
Cercospora kiggelariae Syd., *Ann. Mycol.* **22**: 434 (1924).

Specimens: Western Cape Province, Stellenbosch, *Kiggelaria africana* (Flacourtiaceae), C.K. Brain, No. 1449, (holotype, not examined); Cape Province, *K. africana*, Sept. 1928, Verwoerd No. 298, PREM 46354; Cape Province, Stellenbosch, Coetzenburg, *K. africana*, P.S. Knox-Davies, Apr. 1988, PREM 51111; Transvaal, Schagen, Nelspruit, *K. africana*, L.C.C. Liebenberg, Mar. 1932, PREM 26315.

79. ***kikuchii*** *Cercospora* T. Matsumoto & Tomoyasu, *Ann. Phytopathol. Soc. JPN* **1**: 1 (1925).
Cercosporina kikuchii T. Matsumoto & Tomoyasu (*l.c.*), alternative name.

Specimen: ?, *Glycine max* seed (Fabaceae), Division of Plant & Seed Control, 20 Feb. 1979, PREM 45471.

The specimen in PREM bears no collection data, and since this collection was obtained by the Division of Plant Control, it remains unclear whether this fungus occurred on local or imported seed.

80. ***knoxdaviesii Stigmina*** **Crous & U. Braun nom. nov.**
Cercospora caffra Syd. & P. Syd., *Ann. Mycol.* **12**: 267 (1914) (basionym), non *Stigmina caffra* (Wakef.) M.B. Ellis, *Mycol. Pap.* **72**: 42- 43 (1959).

Etym.: named for Prof. Peter S. Knox-Davies, head of the Department of Plant Pathology, University of Stellenbosch, 1970-1991. Fig. 6.

Leaf spots amphigenous, brown, subcircular, immarginate, 1-6 mm diam. *Mycelium* internal, composed of brown hyphae, giving rise to brown stromata, 50-80 µm wide, 20-30 µm high, composed of brown, aggregated pseudoparenchymatal cells. *Conidiomata* amphigenous, predominantly hypophyllous, brown, 50-90 µm wide, 30-70 µm high. *Conidiophores* in dense, rich fascicles, arising from stromata, brown, verruculose, reduced to conidiogenous cells. *Conidiogenous cells* integrated, brown, cylindrical to doliiform, straight or geniculate-sinuous, verruculose, producing conidia enteroblastically and percurrently to form 1-4 transverse, verruculose, irregular annellations, 8-15 x 4-5 µm. *Conidia* solitary, apical, brown, 15-45 x 5-6 µm, verruculose, (0-)3(-6)-septate, cylindrical to obclavate, curved, rarely straight, apex obtuse, base truncate, occasionally with a minute marginal frill.

Specimens: Transvaal, Nelspruit, *Sclerocarya caffra* (Anacardiaceae), S. Hall, May 1913, PREM 6618 (isotype); Transvaal, Schagen, Nelspruit district, *S. caffra*, L.C.C. Liebenberg, May 1932, PREM 26353.

According to Chupp (1954) this collection does not represent a *Cercospora* species, but rather resembles *Exosporium* or *Coryneum*. An examination of the isotype lodged at PREM (6618), and an additional collection (PREM 26353) revealed a species of *Stigmina* Sacc. However, a new combination in *Stigmina* would not be possible, as this epithet is already occupied by *Stigmina caffra* (Wakefield) M.B. Ellis, known from *Erica caffra* in South Africa. Therefore, a new name is introduced, viz. *S. knoxdaviesii*, after Prof. Peter Knox-Davies, who collected many of the cercosporoid fungi examined in this study.

81. *koepkei* *Mycovellosiella* (Krüger) Deighton, *Mycol. Pap.* **144**: 20 (1979).

Cercospora koepkei Krüger, *Ber. Versuch. Zuckerr. W. Java.* **1**: 115 (1890).

Cercospora longipes Butler, *Dept. Agr. India Mem.* **1**: 41 (1906).

Foreign specimens: Tanzania, Kilimboro, *Saccharum officinarum* (Poaceae), D.R.W. Watson, Jul. 1965, PREM 43794, IMI 114253; Zimbabwe, Malosa, Zomba, *S. officinarum*, D.C.M. Corlett, 24 Jul. 1961, IMI 89225, PREM 43795.

Although *C. longipes* is reported by Ellis (1976) to occur in South Africa, there are no specimens in PREM.

82. *lantaniphila* *Mycovellosiella* Crous, U. Braun & M.J. Morris, *S. Afr. J. Bot.* **60**: 327-328 (1994).

Specimen: Transvaal, Komatipoort, Krokodil River, *Lantana camara* (Verbenaceae), C. Hurter, 1 Jun. 1987, PREM 51707 (holotype).

83. *laxa* *Mycovellosiella* (Kalchbr. & Cooke) Deighton, *Mycol. Pap.* **137**: 65 (1974).

Cladosporium laxum Kalchbr. & Cooke, *Grevillea* **9**: 24 (1880).

Specimen: Cape Province, Somerset East, *Printzia pyrifolia* (Asteraceae), MacOwen 1394, Herb. K 115272 (holotype).

84. *leonotidis* *Cercospora* (?) Cooke, *Grevillea* **8**: 72 (1879).

Specimen: Natal, J.M. *Leonotis leonurus* (Lamiaceae), Wood 5, 1877, PREM 10175.

Chupp & Doidge (1948) comment that the fungus associated with PREM 10175 is *Puccinia leucadis*, and that this collection number has been used for more that one fungus. Chupp (1954) states that *Cercospora leonotidis* has subhyaline conidia, suggesting that this species must be reallocated to another genus. However, no material could be located at PREM.

85. *liebenbergii* *Cercostigmina* (Syd). Crous & U. Braun comb. nov. Fig. 7.

Cercospora liebenbergii Syd., *Ann. Mycol.* **33**: 235 (1935).
Pseudocercospora liebenbergii (Syd.) Deighton, *Mycol. Pap.* **140**: 15 (1976).
Stigmina rauvolfiae M.B. Ellis, *More Dematiaceous Hyphomycetes*, p. 116, Kew (1976).

Leaf spots amphigenous, irregular, light brown on lower surface, grey on upper surface with a dark brown margin, 3-10 mm diam. Mycelium internal, composed of smooth olivaceous hyphae, forming suprastomatal stromata, 20-60 µm wide, 15-40 µm high, composed of brown, aggregated pseudoparenchymatal cells. *Conidiomata* amphigenous, dark brown, sporodochial, 40-80 µm wide, 20-50 µm high. *Conidiophores* in rich, dense fascicles, arising from stromata, dark brown, smooth to verrucose, simple, straight or slightly curved, 0-2-septate, 25-40 x 4-7 µm. *Conidiogenous cells* brown, smooth to verrucose, straight, cylindrical, tapering to a rounded or truncate apex, proliferating 1-4 times percurrently, 10-30(-35) x 4-6 µm; conidial scars unthickened, inconspicuous. *Conidia* solitary, olivaceous, smooth to finely roughened, indistinctly multiseptate, cylindric to obclavate, with an obtuse apex and obconically truncate base which is minutely thickened and refractive, with an occasional marginal frill, 25-100 x 4-6 µm.

Specimens: Transvaal, Schagen, Nelspruit, *Rauvolfia caffra* (Apocynaceae), L.C.C. Liebenberg, Mar. 1932, PREM 26177 (holotype); Transvaal, Schagen, Nelspruit, *R. caffra*, L.C.C. Liebenberg, Jun. 1939, PREM 30964 (co-type); Transvaal, Louis Trichardt, Entabeni, *R. caffra*, W.F.O. Marasas, Apr. 1964, PREM 42685; Schagen, Nelspruit, *R. caffra*, L.C.C. Liebenberg, Jun. 1939, IMI 37995 (type of *Stigmina rauvolfia*).

In an examination of the type and additional collections of this species, olivaceous, fairly *Pseudocercospora*-like, verruculose conidia were found. Conidiogenous cells proliferated enteroblastically and percurrently, and not sympodially as in *Pseudocercospora*. Annellations on the conidiogenous cells were generally not as rough and thick-walled as in *Stigmina*, suggesting *Cercostigmina*. In 1976 Ellis described a new species from the same host, namely *Stigmina rauvolfia* M.B. Ellis. A comparison of the type of *Cercospora liebenbergii* and *S. rauvolfia* found them to be identical. Conidiomata on the type of *S. liebenbergii* were also observed among spermogonia and immature ascomata of a *Mycosphaerella* sp.

It is interesting to note that L.C.C. Liebenberg (an agriculture extension officer) was an enthusiastic collector of cercosporoid fungi, and that he collected most of the South African specimens of these fungi lodged in herbaria worldwide. This is apparently why Sydow named this species in his honour.

86. *longissima* *Cercospora* (Cugini in Herb.) Sacc, *Syll. Fung.* **18**: 607 (1906), *non* Cooke & Ellis, *hom. illegit.*

Cercospora longispora (Cugini in Herb.) Traverso, *Malpighia* **17**: 217 (1902).

Cercospora lactucae Stevenson, *J. Dept. Agr. Puerto Rico* **1**: 105 (1917).

Cercospora lactucae Welles, *Phytopathology* **13**: 289 (1923).

Cercospora lactucae-sativae Sawada, *Formosa Agr. Res. Inst. Rept.* 35: 111 (1928).

Cercospora ixeridis-chinensis Sawada, *Formosa Agr. Res. Inst. Rept.* **86**: 171 (1943).

Cercospora lactucae-indicae Sawada, *Formosa Agr. Res. Inst. Rept.* **86**: 172 (1943).

Specimen: Cape Province, Mocuba, near Port Elizabeth, *Lactuca sativa* (Asteraceae), T. Carvalho, 23 Sept. 1946, PREM 36738.

Morphological dimensions of the local specimen fit those given by Chupp (1954) for *C. longissima*. This is therefore a new record for South Africa.

87. *lupinicola* *Cercospora* Lieneman, *Ann. Missouri Bot. Gard.* **16**: 40 (1929).

Cercospora texensis Tharp, *Mycologia* **9**: 115 (1917) homonym.

Specimen: Natal, Pinetown, *Lupinus* sp. (Fabaceae), V.A. Wager, 1956, PREM 41658.

88. *maesae* *Stenella* Crous & U. Braun, *Sydowia* **46**: 210 (1994).

Holomorph: *Mycosphaerella maesae* Crous & U. Braun, *Sydowia* **46**: 210 (1994).

Specimen: Transvaal, Louis Trichardt, Hangklip Forest Station, *Maesa lanceolata* (Myrsinaceae), R.Y. Anelich, Apr. 1988, PREM 51114a (holotype).

89. *malayensis* *Cercospora* Stev. & Solh., *Mycologia* **23**: 394 (1931).

Specimens: Transvaal, Nelspruit Research Station, *Hibiscus cannabinus* (Malvaceae), L.C.C. Liebenberg, Mar. 1931, PREM 26674; Transvaal, Nelspruit Research Station, *H. cannabinus*, L.C.C. Liebenberg, Apr. 1932, PREM 26312.

Foreign specimens: Zimbabwe, Sinoia, *H. cannabinus*, J.C. Hopkins, 30 Apr. 1928, PREM 34274; Zimbabwe, Shamva, *H. cannabinus*, J.C. Hopkins, 19 Mar. 1930, PREM 34263; Zimbabwe, Harare, *H. cannabinus*, J.C. Hopkins, 13 Mar. 1930, PREM 34262.

90. *marasasii* *Pseudocercospora* Crous & M.J. Wingf., *Mycol. Res*. **95**: 1111 (1991).

Holomorph: *Mycosphaerella marasasii* Crous & M.J. Wingf., *Mycol. Res*. **95**: 1111 (1991).

Specimen: Transvaal, Barberton, *Syzygium cordatum* (Myrtaceae), M.J. Wingfield, 1 Feb. 1988, PREM 50637 (holotype).

91. medicaginis *Cercospora* Ellis & Everh., *Proc. Acad. Nat. Sci. Phila.* Part I **43**: 91 (1891).

This species was reported by Lamprecht & Knox-Davies (1984) from *Medicago* in the Western Cape Province of South Africa.

92. *melaena* *Pseudocercospora* (Syd.) Deighton, *Mycol. Pap.* **140**: 147 (1976).

Cercospora melaena Syd., *Ann. Mycol*. **22**: 434 (1924).

Specimens: Transvaal, Haenertsburg, Woodbush, *Flemingia grahaminiana* (Fabaceae), E.M. Doidge, Aug. 1934, PREM 32911 (syntype); Transvaal, Tzaneen, Magoebaskloof, *F. grahamiana*, W.F.O. Marasas, Oct. 1963, PREM 42683; Transvaal, Tzaneen, *F. grahamiana*, L.C.C. Liebenberg, Jul. 1955, PREM 41401.

93. *melanochaeta* *Phaeoisariopsis* (Ellis & Everh.) Deighton, in Ellis, *More Dematiaceous Hyphomycetes*, p. 230, Kew (1976).

Cercospora melanochaeta Ellis & Everh., *Proc. Acad. Nat. Sci. Phila* **46**: 380 (1894).

Specimens: Natal, Escombe, *Maytenus cymosus* (Celastraceae), A.F. Hearn, 31 Dec. 1937, PREM 33214; Natal, Empangeni, *M. cymosus*, A.P.D. McLean, 1 Sept. 1938, PREM 33069; Transvaal, Schagen, Nelspruit, *M. cymosus*, L.C.C. Liebenberg, Jul. 1935, PREM 32817; Transvaal, Schagen, Nelspruit, *Maytenus* sp., L.C.C. Liebenberg, Apr. 1932, PREM 26350; Transvaal, Nelspruit Research Station, *M. cymosus*, L.C.C. Liebenberg, May 1931, PREM 25997; Cape Province, Kentani, *M. cymosus*, A. Pegler, 24 May 1916, PREM 9771; Natal, Verulam, *M. cymosus*, P. van der Bijl, 12 Sept. 1913, PREM 6946.

94. *musae* *Pseudocercospora* (Zimm.) Deighton, *Mycol. Pap.* **140**: 148 (1976).

Cercospora musae Zimm., *Centralbl. f. Bakt. II* **8**: 219 (1902).
Cercospora musae Mass., *Roy. Bot. Gard., Kew. Bul. Misc. Inform.* **1914**: 159 (1914).
Holomorph: *Mycosphaerella musicola* Leach *ex* Mulder & Stover, *Trans. Br. mycol. Soc.* **67**: 77 (1976).
Mycosphaerella musicola Leach, *Trop. Agric.* **18**: 92 (1941) *nom. nud.*

Foreign specimen: Mozambique, Gondola, *Musa sappientum* (Musaceae), PREM 34275.

Although this species is reported to occur in the Transvaal Province of South Africa by Gorter (1977), no specimens could be located at PREM.

95. *myrticola* *Pseudocercospora* (Speg.) Deighton, *Mycol. Pap.* **140**: 148 (1976).

Cercospora myrticola Speg., *Anal. Soc. Sci. Argentine* **16**: 167 (1883).
Cercospora myrti Erikson, *Revue Mycol.* **8**: 60 (1886).
Cercospora myrti var. *epiphylla* Sacc. (*Myco. Ital.* 1586).
Cercospora saccardiana Scalia, *Atti d. Accad. Gioenia Sci. Nat. Catania IV.* **14**: 35 (1901).
Cercospora amadelpha Syd., *Ann. Mycol.* **30**: 89 (1932).
Fusariella cladosporioides P. Karst., in Hughes, *Can. J. Bot.* **36**: 746 (1958).

Specimen: Cape Province, Wellington, Blauwvlei, *Myrtus communis* (Myrtaceae), E.M. Doidge, 20 Feb. 1912, PREM 2066.

96. *nicotianae* *Cercospora* Ellis & Everh., *Proc. Acad. Nat. Sci. Philad.* **1893**: 170 (1893).

Cercospora raciborskii Sacc. & Syd., *Syll. Fung.* **16**: 1070 (1902).

Specimen: Natal, ?, *Nicotiana tabacum* (Solanaceae), Mar. 1923, PREM 32498.

Foreign specimens: USA, Texas, *Nicotiana* sp., O. Olson, 20 Jul. 1909, PREM 46169; Zimbabwe, Balaka, *N. tabacum*, D.C.M. Corlett, 27 Feb. 1959, PREM 43796; Herb IMI, *N. tabacum*, J.L. Grieg, 8 Nov. 1951, PREM 41101; Zimbabwe, Harare, *Nicotiana* sp., J.C. Hopkins, 3 Mar. 1938, PREM 34276; Zimbabwe, Trelawney, *Nicotiana* sp., J.C. Hopkins, 15 Jun. 1936, PREM 34269; Zimbabwe, Harare, *Nicotiana* sp., J.C. Hopkins, 29 Dec. 1931, PREM 34267, 34268; ?, Eldorado, *Nicotiana* sp., J.C. Hopkins, 17 Dec. 1931, PREM 34266; Zimbabwe, Harare, *Nicotiana* sp., J.C. Hopkins, 30 Apr. 1929, PREM 34260; Zimbabwe, *Nicotiana* sp., ?, 30 Apr. 1913, PREM 6595; Flora of the Philippines, *Nicotiana tabacum*, E.D. Merrill, May 1913, PREM 13251; Fungi Malayana C.F. Baker, *Nicotiana tabacum*, Dec. 1914, PREM 9586; Swaziland, *Nicotiana* sp., C. Grey, Feb. 1910, PREM 894.

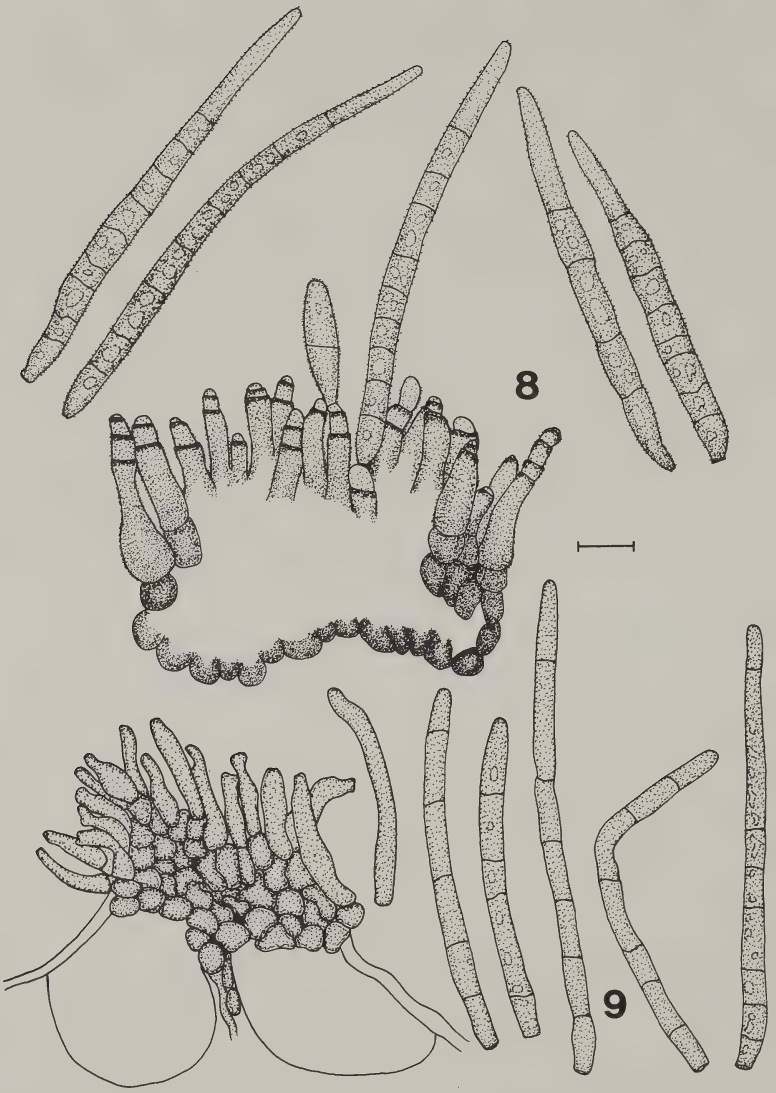
97. *oblecta* *Stigmina* (Syd.) Crous & U. Braun comb. nov.

Cercospora oblecta Syd., *Ann. Mycol.* **33**: 235 (1935). Fig. 8.

Leaf spots amphigenous, irregular, 2-6 mm diam., red-brown, becoming grey-brown with age. *Conidiomata* epiphyllous, sporodochial, brown, up to 80 µm wide, and 60 µm high. *Conidiophores* in rich, dense fascicles, arising from stromata, brown, simple, 1-2-septate, verruculose, cylindrical to irregular, 30-50 x 4-7 µm. *Conidiogenous cells* brown, becoming olivaceous toward apex, verruculose, straight or bent, tapering to a rounded or subtruncate apex, proliferating 1-4 times enteropercurrently, 20-40 x 4-7 µm; conidial scars unthickened, inconspicuous. *Conidia* solitary, brown, becoming olivaceous toward apex, verruculose, cylindrical to obclavate with a rounded apex and obconically subtruncate base, conspicuously 1-15-septate, guttulate, 40-120 x 4.5-8 µm, frequently with a minute basal marginal frill.

Specimen: Transvaal, Barberton, *Annona senegalensis* (Annonaceae), L.C.C. Liebenberg, Apr. 1931, PREM 26043 (holotype).

The conidia of the type specimen are dark brown, finely verruculose, with slightly darkened, refractive hila and minute



Figs 8, 9. Conidiophores and conidia of *Stigmina oblecta* and *Pseudocercospora oliniae* (bar = 10 µm). Fig. 8. *S. oblecta* (PREM 26043). Fig. 9. *P. oliniae* (PREM 46349).

marginal frills. The conidiogenous cells are brown, finely verruculose, with widely spaced conspicuous annellations, giving rise to conidia enteroblastically and percurrently. The conidia are somewhat *Cercostigmina*-like, but the structure of the conidiophores and conidiogenous cells place this species in *Stigmina*.

98. ***occidentalis*** *Phaeoramularia* (Cooke) Deighton in Ellis, *More Dematiaceous Hyphomycetes*, p. 322, Kew (1976).

Cercospora occidentalis Cooke, *Hedwigia* **17**: 39 (1978).
Ramularia cassiicola Heald & Wolf, *Bull. U.S. Bur. Pl. Ind.* **226**: 101 (1912).
Cercosporina occidentalis (Cooke) Sacc., *Syll. Fung.* **25**: 906 (1931).
Cercospora personata var. *cassiae occidentalis* Berk. & Curtis, *Grevillea* **3**: 106 (1875).
Cladosporium personatum var. *cassiae* Thüm., *Myc. Univ.* p. 1964 (1881).
Cercospora paulensis P. Henn., *Hedwigia* **48**: 18 (1909).
Cercospora occidentalis Ellis & Kellerm., *U.S.D.A. Bur. Plant Ind. Bull.* **226**: 101 (1912).
Cercospora somalensis Curzi, *Bol. R. Staz. Patol. Veget. n.s.* **12**: 158 (1932).
Cercospora sphaeroidea Speg., *Ann. Soc. cient. Argent.* **9**: 279 (1880).
Phaeoisariopsis sphaeroidea (Speg.) Brown & Morgan-Jones, *Mycotaxon* **4**: 303 (1976).

Specimens: Transvaal, Schagen, Nelspruit, *Cassia delagoensis* (Fabaceae), L.C.C. Liebenberg, PREM 32881; Transvaal, Schagen, Nelspruit, *C. delagoensis*, L.C.C. Liebenberg, May 1932, PREM 26352; Transvaal, Barberton, Nelspruit Research Station, *C. delagoensis*, L.C.C. Liebenberg, Apr. 1931, PREM 26033.

One of the synonyms listed by Chupp (1954), *Cercospora sphaeroidea* Speg., was transferred to *Phaeoisariopsis* Brown & Morgan-Jones (1976). However, Deighton (1979) stated that it would be better accommodated in *Phaeoramularia*. Brown & Morgan-Jones (1976) also placed *Cercospora cassiocarpa* (Sacc.) Chupp (= *C. occidentalis* var. *cassiocarpa* Sacc.) in *Cercosporidium* as *C. cassiocarpum* (Sacc.) Brown & Morgan-Jones. However, an examination of syntype material at PREM (on *Cassia occidentalis*, Flora of the Philippines, E.D. Merrill, Nov.-Dec. 1912, No. 8463, PREM 13200, BPI), suggested that the earlier name, *C. cassiocarpa* (Sacc.) Chupp, was correct.

99. ***oliniae*** *Pseudocercospora* (Verwoerd & Dippenaar) Crous & U. Braun comb. nov. Fig. 9.

Cercospora oliniae Verwoerd & Dippenaar, *S. Afr. J. Sci.* **27**: 326 (1930).

Leaf spots amphigenous, circular, brown, 0.5-3 mm diam. *Mycelium* internal. *Caespituli* hypophyllous, dark brown, up to 150 µm wide, and 80 µm high. *Conidiophores* arising from dark brown stromata in rich, dense fascicles, subcylindric, ampulliform, straight to geniculate p-sinuous, 25-50 x 3-5 µm, brown, smooth, 0-1-septate. *Conidiogenous cells* mono- to polyblastic, sympodial, conidial scars unthickened, inconspicuous, 10-25 x 3-5 µm. *Conidia* solitary, olivaceous, smooth, guttulate, indistinctly 1-10-septate, cylindric, straight or curved, with a rounded apex and subtruncate base, guttulate, 20-110 x 3-4.5 µm.

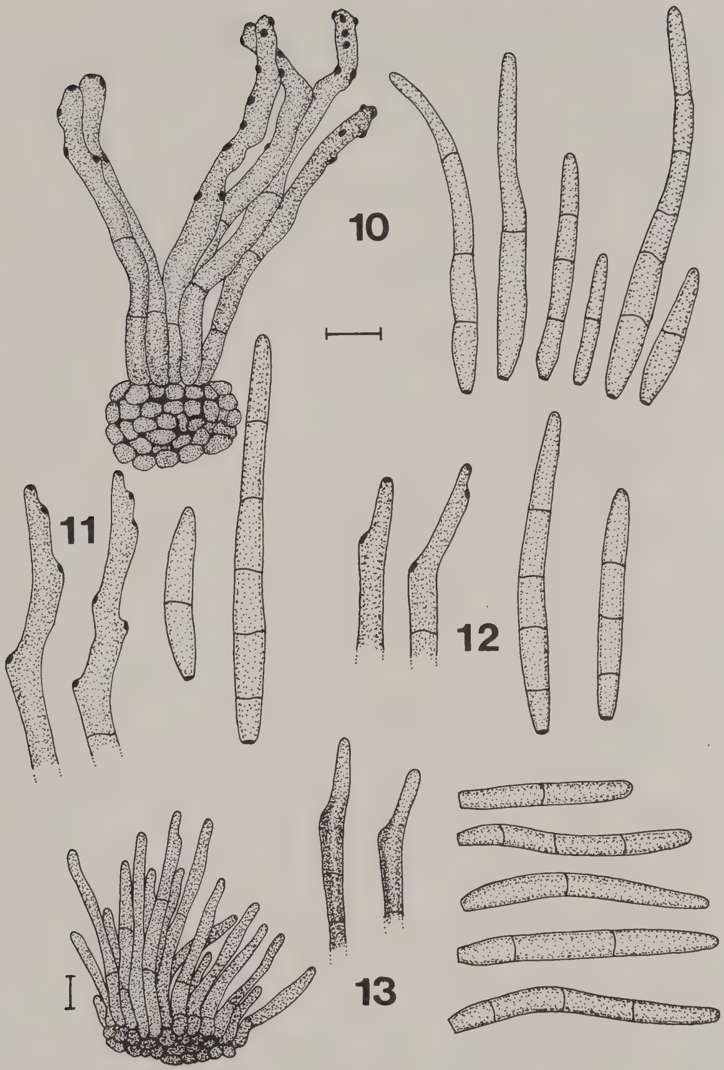
Specimens: Cape Province, Stellenbosch, *Olinia cymosa* (Oliniaceae), B.J. Dippenaar, May 1929, (Verwoerd 391) PREM 46349 (holotype); Cape Province, Stellenbosch, *O. cymosa*, B.J. Dippenaar, Mar. 1929, PREM 46808; Cape Province, Stellenbosch, *O. cymosa*, B.J. Dippenaar, Feb. 1929, PREM 46807; Cape Province, Stellenbosch, *O. cymosa*, B.J. Dippenaar, Mar. 1929, PREM 34282.

The olivaceous conidia with unthickened hila, and conidiogenous cells with unthickened scars suggest that *Pseudocercospora* is the best genus to accommodate this taxon.

100. ***omphacodes*** *Passalora* (Ellis & Holway) Crous & U. Braun comb. nov. Figs 10-12.

Cercospora omphacodes Ellis & Holway, *J. Mycol.* **1**: 5 (1885).
Cercospora phlogina Peck, *N.Y. State Mus. Bull.* **150**: 24 (1911).

Leaf spots 3-12 mm diam., circular to irregular, amphigenous, brown, becoming grey with a dark margin. *Caespituli* amphigenous, dark brown, up to 70 µm wide, and 40 µm high. *Conidiophores* fasciculate, arising from stromata through stomata, fascicles rich, dense, conidiophores 40-80 x 3-5 µm, 1-3-septate, unbranched, flexuous, geniculate-sinuous, brown. *Conidiogenous cells* terminal, olivaceous-brown, smooth, geniculate-sinuous, tapering to a rounded apex, 15-50 x 3-5 µm, with slightly thickened, darkened, refractive conidial scars. *Conidia* olivaceous, cylindric-obclavate, indistinctly 1-5-septate,



Figs 10-13. Conidiophores and conidia of *Passalora omphacodes* and *Pseudocercospora rogersoniana* (bar = 10 µm). Figs 10-12. *P. omphacodes*, PREM 6836, NY holotype of *Cercospora omphacodes*, and NYS, holotype of *C. phlogina*, respectively. Fig. 13. *P. rogersoniana* (NY, holotype).

straight to mildly curved, apex obtuse, base obconic, with slightly thickened, darkened, refractive hila, 20-70 x 3-5 µm.

Specimen: Natal, Cramond, *Phlox drummondi* (Polemoniaceae), Hill, Mar. 1913, PREM 6836.

Local material, type specimens (*Cercospora phlogina* Peck, on *Phlox* sp., USA, Floral Park, N.Y., 28 Jun. 1900, Steward, NYS, holotype; *C. omphacodes* Ellis & Holw., on *Phlox divaricata*, USA, Iowa, Decorah, 31 Aug. 1884, Holway, NY, holotype) and numerous additional collections from NY, including Barth., Fungi Columb. 4707 and Ellis & Everh., North Am. Fung. 2975, have been examined. The conidial scars were slightly thickened, conspicuous, somewhat darkened, refractive, and thus typical of *Passalora*.

Braun & Rogerson (1993) referred a superficially similar collection on *Phlox longifolia* to *C. omphacodes*. The leaf spots and conidia are similar to that of the latter taxon. The conidial scars are, however, unthickened, and inconspicuous. Hence, this collection represents an undescribed species of *Pseudocercospora*, distinct from *Passalora omphacodes* in the following microscopical features: *Mycelium* internal, hyphae septate, branched, subhyaline, 1-2.5 µm wide. *Stromata* well-developed, 25-80 µm in diam., somewhat coloured, pale yellowish olivaceous. *Conidiophores* numerous, in loose to usually dense fascicles, arising from stromata, through stomata, filiform, 20-80 x 2-4 µm, unbranched, flexuous, septate, smooth, subhyaline to pale olivaceous, apically often slightly geniculate. *Conidiogenous cells* terminal, polyblastic, conidial scars inconspicuous, unthickened. *Conidia* solitary, subcylindrical, narrowly obclavate or clavate, 15-55 x 3-3.5 µm, almost hyaline to pale olivaceous, smooth, apex obtuse, base more or less truncate, hila neither thickened nor darkened. A few superficial hyphae, arising through stomata, have been observed. However, it is not clear if they belong to the same fungus. The *Pseudocercospora* species on *Phlox* is described as follows:

Pseudocercospora rogersoniana **U. Braun & Crous sp. nov.** (Pseudonym: *Pseudocercospora omphacodes* (Ellis & Holw.) U. Braun & C.T. Rogerson, *Mycotaxon* **46**: 267, 1993). Fig. 13.

Etym.: C.T. Rogerson, North American Mycologist.

Mycelium immersum: hyphae septatae, ramosae, subhyalinae, 1-2.5 µm latae. *Stromata* bene evoluta, substomatalia, 25-80 µm diam., pallide flavido-olivacea. *Conidiophora* numerosa, saepe dense fasciculata, per stroma emergentia, filiformia, 20-80 x 2-4 µm, simplicia, flexuosa, septata, laevia, subhyalina vel pallide olivacea, ad apicem leniter geniculata. *Cellulae conidiogenae* terminaliae, polyblasticae, sympodiales. Cicatrices conidiales inconspicuae, non incrassatae. *Conidia* solitaria, subcylindrica, anguste obclavata or clavata, 15-55 x 3-3.5 µm, 0-3-septata, subhyalina vel pallide olivacea, laevia, ad apicem obtusa, basi plus minusve truncata, hila non incrassata, incoloria.

Specimen: USA, Utah, Box Elder Co., *Phlox longifolia* (Polemoniaceae), C.T. Rogerson, 29 Jun. 1967, NY (holotype).

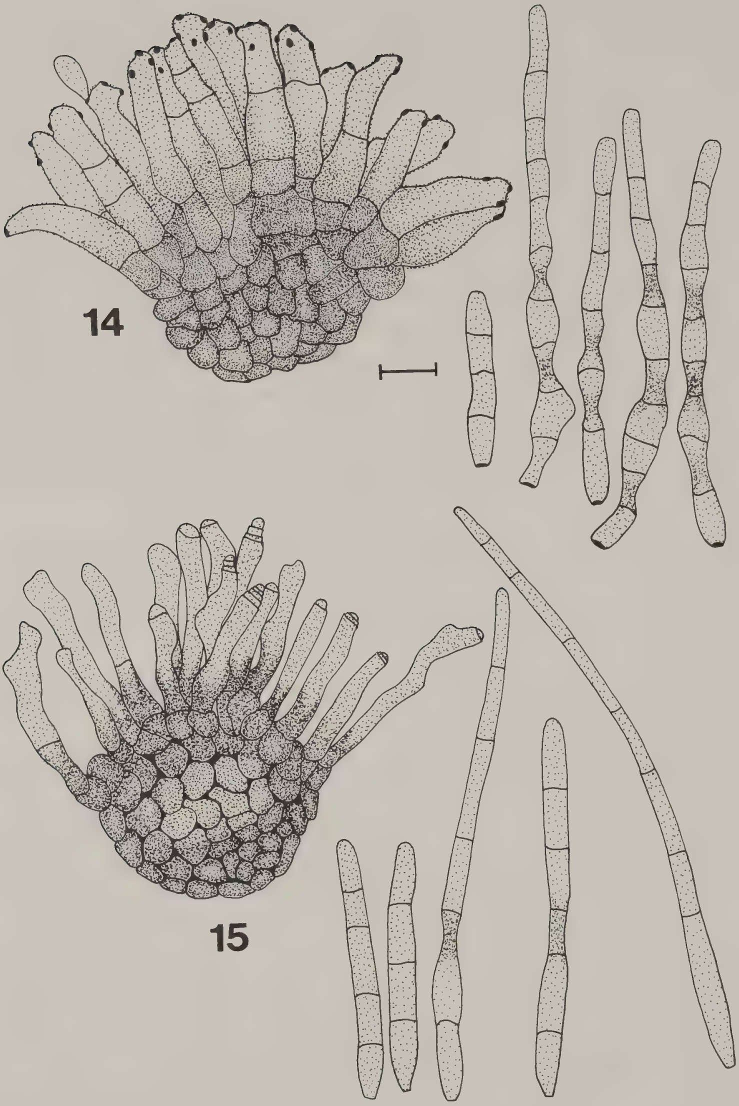
101. ***oryzae*** *Cercospora* Miyake, *J. Coll. Agr. Imp. Univ. Tokoyo* **2**: 263 (1910).
Holomorph: *Sphaerulina oryzina* Hara, *Diseases of the rice plant Japan* p. 144 (1918).

Foreign specimen: Herbario Micologico, Colombia, Bogota, *Oryza sativa* (Poaceae), PREM 32861.

Although Gorter (1977) reports this species from Northern Transvaal, no specimens could be located at PREM.

102. ***pachycarpi*** *Passalora* (Chupp & Doidge) Crous & U. Braun comb. nov. Fig. 14.
Cercospora pachycarpi Chupp & Doidge, *Bothalia* **4**: 889 (1948).

Leaf spots angular, amphigenous, grey-brown, 3-20 mm diam. *Mycelium* internal. *Caespituli* predominantly epiphyllous, up to 70 µm wide, and 40 µm high. *Conidiophores* fasciculate, arising from stromata, fascicles dense, rich, conidiophores 15-35 x 5-7 µm, medium brown, becoming olivaceous toward apex, verruculose, irregular in width, straight to slightly curved, 1-3-septate. *Conidiogenous cells* verruculose, olivaceous, straight or slightly curved, with numerous terminal, slightly thickened, refractive, darkened conidial scars, 10-25 x 5-6 µm. *Conidia* olivaceous, smooth, obclavate, straight or curved, 1-9-septate,



Figs 14, 15. Conidiophores and conidia of *Passalora pachycarpi* and *Pseudocercospora pareirae* (bar = 10 µm). Fig. 14. *P. pachycarpi* (PREM 2208). Fig. 15. *P. pareirae* (PREM 26314).

with obtuse apex and obconically truncate base, 20-130 x 4-6 µm.

Specimen: Transvaal, Pretoria, Wonderboom, *Pachycarpus schinzianus* (Asclepiadaceae), P. van der Bijl, 23 Mar. 1912, PREM 2208 (holotype).

Chupp (1954) described the conidia as olivaceous. We examined the type and found them to also have slightly thickened, refractive hila. The olivaceous conidiogenous cells also have thickened, refractive scars. These features place this species in *Passalora*.

103. ***pallidissima*** *Pseudocercospora* (Chupp) Deighton, *Mycol. Pap.* **140**: 149 (1976).
Cercospora pallidissima Chupp, *A monograph of the fungus genus Cercospora,* p. 350 (1954).

Specimen: Transvaal, Schagen, Nelspruit district, *Smilax kraussiana* (Smilacaeae), Jun. 1939, PREM 32922.

Leaf spots of the local collection are round to irregular, 5-15 mm in diam., brown with a dark brown to red margin, and mostly convined by leaf veins. Conidiophores are not geniculate, and up to 30 µm in length, while conidia are 3-6-septate, 25-65 x 2.5-4 µm, closely fitting the description given by Chupp (1954). This is a new record for South Africa.

104. ***palmivora*** *Stigmina* (Sacc.) Hughes, *Mycol. Pap.* **49**: 13 (1952).
Exosporium palmivorum Sacc. *apud* Trelease, *Rep. Mo. Bot. Gdns*, p. 159 (1898).
Cercospora preisii Bubak, (1903) *nom. nud.*
Exosporium preissii Bubak, *Ann. Mycol., Berl.*, **2**: 400 (1904).

Specimen: Natal, Zululand, *Phoenix reclinata* (Arecaceae), L.C.C. Liebenberg, Jul. 1953, PREM 40714 (specimen depauperate).

105. ***pareirae*** *Pseudocercospora* (Speg.) Crous & U. Braun comb. nov. Fig. 15.
Cercospora pareirae Speg., *Anal. Mus. Nac. B. Aires* **20**: 440 (1910).

Leaf spots amphigenous, red-brown, 2-10 mm diam. *Mycelium* internal. *Caespituli* amphigenous, developing from stromata situated over stomata, brown, 35-50 µm wide, and 40-70 µm high. *Conidiophores* fasciculate, arising from stromata, fascicles dense, rich, divergent, medium brown, cylindric to geniculate-sinuous, 0-3-septate, 30-60 x 4-5 µm. *Conidiogenous cells* integrated, terminal, olivaceous, straight or geniculate-sinuous, proliferating sympodially or up to 4 times percurrently, 20-30 x 3.5-5 µm; conidial scars unthickened, inconspicuous. *Conidia* solitary, pale olivaceous, smooth, obclavate with subobtuse apex and long obconic base, straight or slightly curved, indistinctly 3-11-septate, 35-125 x 3-5.5 µm; hila unthickened.

Specimen: Transvaal, Schagen, Nelspruit, *Cissampelos mucronata* (Menispermaceae), L.C.C. Liebenberg, Apr. 1932, PREM 26314.

In the South African specimen (verified by Chupp) conidia are pale olivaceous with unthickened hila. Furthermore, conidiogenous cells proliferate sympodially as well as enteroblastically and percurrently, placing this species in *Pseudocercospora*.

106. ***pastinacae*** *Passalora* (Sacc.) U. Braun, *Nova Hedwigia* **55**: 213 (1992).

Cercospora apii var. *pastinacae* Sacc., *Syll. Fung*. **4**: 442 (1886).
Cercospora pastinacae (Sacc.) Peck, *N.Y. State Mus. Bull.* **157**: 45 (1912).

This fungus was reported by Doidge (1924) on *Pastinaca sativa* (Apiaceae), but no specimen could be located in PREM.

107. ***pastinacae*** *Pseudocercosporella* (P. Karst.) U. Braun, *Nova Hedwigia* **56**: 444 (1993).

Cercosporella pastinacae P. Karst., *Hedwigia* **23**: 63 (1884).
Phyllosticta umbellatarum Rabenh., *Fungi eur. exs. ad. nov., ser., cent. XII*, No 1263, Dresden 1869 and *Hedwigia* **8**: 89 (1869) *nom. nud.*
Cylindrosporium pimpinellae var. *pastinacae* Sacc., *Syll. Fung*. **11**: 583 (1895).
Phloeospora laserpitii Bres., *Fungi Trident., ser II, fasc*. **8/10**: 45 (1892).
Cylindrosporium septatum Romell, in Sacc., *Syll. Fung*. **10**: 503 (1892).
Septoria laserpitii Cav., *Bot. Centrlbl.*, p. 72 (1894).
Cylindrosporium latifolii Magn., *Hedwigia* **39**: 113 (1900).
Septogloeum laserpitii (Bres.) Magn. (l.c., p. 111).
Septogloeum septatum (Romell) Magn. (l.c., p. 113).
Ramularia pastinacae (Krast.) Lindr. & Vestergr., in Lindr., *Acta Soc. Fauna Fl. Fenn*. **22**: 8 (1902).
Cercospora pastinacina Solh., *Ill. Biol. Monogr*. **12**: 45 (1929).
Phloeospora septata (Romell) Maire, *Bull. Soc. Mycol. Fr*. **46**: 241 (1930).

Cercoseptoria laserpitii (Bres.) Petr., *Ann., Mycol.* **38**: 178 (1940).
Cercosporella eremodauci Annalijev, *Nov. sist. niz. rast.* **1972**: 197 (1972).
Cercosporella physospermi Annalijev (l.c., p. 203).
Pseudocercosporella laserpitii (Bres.) U. Braun, *Nova Hedwigia* **47**: 348 (1988).

Specimen: Natal, Cedara, *Apium graveolens* Linn. var. *dulce* D.C. (Apiaceae), 1 Jun. 1912, PREM 2099.

Braun (1993a) states that this species occurs throughout Europe and Central Asia. This is the first report from South Africa. PREM 2099 also has material of *Ramularia heraclei* occurring on the same lesions. Mixed infections of these two species are common.

108. ***perfoliati*** *Mycovellosiella* (Ellis & Everh.) Muntañola, *Lilloa* 30: 201 (1960).

Cercospora perfoliati Ellis & Everh., *J. Mycol.* **5**: 71 (1889).
Cercospora agerati F.L. Stevens, *Bull. Bernice P. Bishop Mus.* **19**: 154 (1925).
Ragnhildiana agerati (Stev.) Stevens & Solheim, *Mycologia* **23**: 402 (1931).
Cladosporium versicolor Bond, *Ceylon J. Sci., sect. A, Botr.*, **12**: 183 (1947).
Ramularia agerati Sawada, *Spec. Publ., Coll. Agric. natn. Taiwan Univ.* **8**: 190 (1959).
Cercosporella coorgica Muthappa, *Mycopath. Mycol. appl.* **34**: 194 (1968).

Specimen: Natal, south coast, outside Vernon Crookes Nature Reserve, *Ageratum conyzoides* (Asteraceae), M.J. Morris, 27 Apr. 1990, PREM 51708.

109. ***persicariae*** *Pseudocercospora* (Yamam.) Deighton, *Mycol. Pap.* 140: 150 (1976).

Cercospora persicariae Yam., *J. Soc. Trop. Agr. Formosa* **6**: 605 (1934).

Specimen: Transvaal, Barberton, Nelspruit, *Polygonum tomentosum* (Polygonaceae), L.C.C. Liebenberg, May 1931, PREM 26011.

Chupp (1954) mentions that the South African collection differed from the type in having narrower conidia. Examination showed conidiophores to be fasciculate, a feature reported as mostly absent (or 2-8 conidiophores per fascicle) by Chupp. However, conidia were well within the range reported for this species by Chupp, but were slightly narrower. The other species from

Taiwan on this host commented on by Chupp has been reallocated to *Pseudocercospora* as *P. polygonicola* (Kar & Mandal) Deighton. The South African collection seems to be intermediate between these two species. However, we feel that it is best retained in *P. persicariae* for the present.

110. ***personata*** *Passalora* (Berk. & Curt.) Shakil A. Khan & M. Kamal, *Pakistan J. Sci. Res.* **13**: 188 (1961).
Cladosporium personatum Berk. & Curtis, *Grevillea* **3**: 106 (1875).
Cercospora personata (Berk. & Curt.) Ellis & Everh., *J. Mycol.* **1**: 63 (1885).
Cercosporidium personatum (Berk.& Curt.) Deighton, *Mycol. Pap.* **112**: 71 (1976).
Septogloeum arachidis Raciborski, *Z. PflKrankh.* **8**: 66 (1898).
Cercospora arachidis Henn., *Hedwigia* **41**: 18 (1902).
Holomorph: *Mycosphaerella berkeleyi* W.A. Jenkins, *J. Agric. Res.* **56**: 330 (1938).

Specimens: Cape Province, Stellenbosch, *Arachis hypogaea* (Fabaceae), L. Verwoerd, Apr. 1923, PREM 45981; Transvaal, Hartebeespoort Exp. Sta., *A. hypogaea*, J. Sellschop, May 1939, PREM 36704; Transvaal, Hartebeespoort Exp. Sta., *A. hypogaea*, J. Sellschop, May 1939, PREM 32137; Transvaal, Britstown, *A. hypogaea*, J. Sellschop, May 1939, PREM 32136; Transvaal, Pretoria, *A. hypogaea*, Hayward, 13 Mar. 1939, PREM 30654; Transvaal, Crecy, *A. hypogaea*, J. Sellschop, 7 Mar. 1939, PREM 30649; Transvaal, Nelspruit, *A. hypogaea*, L.C.C. Liebenberg, Mar. 1931, PREM 26675; Transvaal, *A. hypogaea*, P. Dros, Mar. 1931, PREM 25924; Transvaal, *A. hypogaea*, W. Steen, 1 Apr. 1930, PREM 25364; Transvaal, Barberton, *A. hypogaea*, J.S. Parsons, 1 Apr. 1930, PREM 25363; Natal, Cedara, *A. hypogaea*, R.R. Staples, 17 Mar. 1923, PREM 17060; Natal, Pietermaritzburg, *A. hypogaea*, T. Ernleben, 22 Mar. 1922, PREM 15447; Transvaal, Pretoria, Skinners Court, *A. hypogaea*, Feb. 1910, PREM 993; Transvaal, Pretoria, Skinners Court, *A. hypogaea*, 26 Mar. 1911, PREM 1287; Natal, Mount Edgecombe, *A. hypogaea*, V.A. Wager, 17 Jun. 1944, PREM 34194.

Foreign specimens: Tanganyika, *A. hypogaea*, J. Sellschop, May 1948, PREM 36703; Uganda, *A. hypogaea*, R.A. Drümmer, Nov. 1915, PREM 11945, 11946; Fungi Malayana C.F. Baker, *A. hypogaea*, Oct. 1913, PREM 9930; Mozambique, *A. hypogaea*, C.W. Howard, 8 Jun. 1908, PREM 978.

111. ***petuniae*** *Cercospora* (Saito) Muller & Chupp, *Arch. Inst. Biol. Veg. Rio de Janeiro* **3**: 96 (1936).
Cercosporina petuniae Saito, *Trans. Tottori Soc. Agr. Sci.* **3**: 271 (1931).

Cercospora petuniae Sandu-Ville & Serea, in Sandu-Ville *et al.*, *Lucr. Sti. Inst. Agron.* **1962**: 94 (1962). nom. nud.

Specimens: Natal, Pietermaritzburg, *Petunia* sp. (Solanaceae), P.S. Knox-Davies, May 1956, PREM 41629, 41530.

112. *physalidis Cercospora* Ellis, *Am. Nat.* **16**: 810 (1882).

Cercospora physalicola Ellis & Barth., *Erythea* **4**: 28 (1896).

Specimen: Natal, Cramond, *Physalis* sp. (Solanaceae), 1 May 1990, S. R. McLennan, PREM 51703.

113. *piaropi Cercospora* Tharp, *Mycologia* **9**: 113 (1917).

Specimens: Transvaal, Hectorspruit, *Eichhornia crassipes* (Pontederiaceae), M.J. Morris, Aug. 1986, PREM 49422, 49423.

114. *pini-densiflorae Pseudocercospora* (Hori & Nambu) Deighton, *Trans. Br. mycol. Soc.* **88**: 390 (1987).

Cercospora pini-densiflorae Hori & Nambu, *Tokyo J. Pl. Prot.* **4**: 353 (1917).
Cercoseptoria pini-densiflorae (Hori & Nambu) Deighton, *Mycol. Pap.* **140**: 167 (1976).
Holomorph: *Mycosphaerella gibsonii* Evans, *Mycol. Pap.* **153**: 61 (1984).

Specimens: Cape Province, Isidenge, *Pinus radiata* (Pinaceae), M.J. Wingfield, 14 Nov. 1984, IMI 296387, PREM 48216; Transvaal, Nelshoogte, *P. radiata*, M.J. Wingfield, 22 Nov. 1984, IMI 296388, PREM 48217; Transvaal, Sabie, D.R. De Wet Research Station, *P. griffithii*, M.J. Wingfield, 24 Nov. 1984, IMI 296389, PREM 48218.

115. *pistiae Cercospora* Nag Raj, Govindu & Thirumalachar, *Sydowia* **24**: 299 (1970).

Specimens: Eastern Transvaal, Sabie River, Kruger National Park, *Pistia stratiotes* (Araceae), M.J. Morris, 20 May 1988, PREM 51704; Eastern Transvaal, Sabie, Kruger National Park, *P. stratiotes*, C.J. Cilliers, 17 Feb. 1988, PREM 51705.

116. *plantaginis Cercospora* Sacc., *Michelia* **1**: 267 (1879).

Cercospora plantaginella Tehon, *Mycologia* **16**: 139 (1924).

Specimen: Natal, canefield near Camperdown, *Plantago lanceolata* (Plantaginaceae), M.J. Morris, 11 Feb. 1993, PREM 51706.

117. ***pouzolziae*** *Pseudocercospora* (Syd.) Guo & Liu, *Acta Mycol. Sinica* **11**: 298 (1992). Fig. 16.
Cercospora pouzolziae Syd., *Ann. Mycol.* **33**: 236 (1935).

Leaf spots amphigenous, subcircular, 2-5 mm diam., red-brown, becoming grey in the centre. *Caespituli* epiphyllous, brown, arising from stromata, up to 70 µm wide, and 40 µm high. *Conidiophores* fasciculate, situated on stromata, fascicles dense, rich, olivaceous, straight, tapering to a conic apex, 20-30 x 3-4.5 µm. *Conidiogenous cells* olivaceous, unbranched, straight or slightly curved, smooth, cylindric with slight apical taper, proliferating sympodially or once percurrently, 10-25 x 3-4 µm; conidial scars unthickened. *Conidia* olivaceous, solitary, smooth, cylindrical with slight apical taper, apex conic, base obconically truncate, indistinctly 4-8-septate, strongly curved, 25-110 x 3-4 µm.

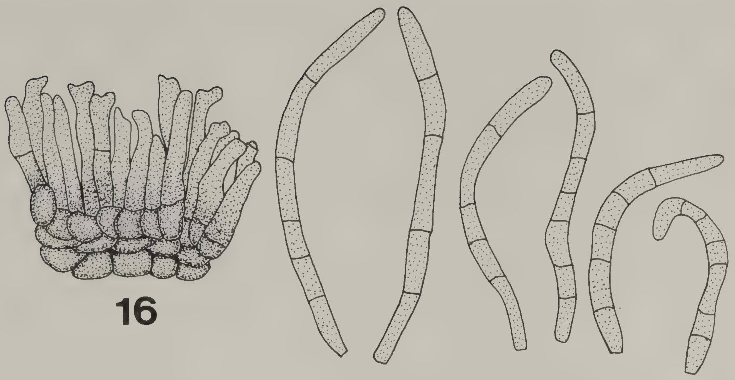
Specimen: Transvaal, Barberton, *Pouzolzia hypoleuca* (Urticaceae), L.C.C. Liebenberg, May 1931, PREM 26013 (holotype).

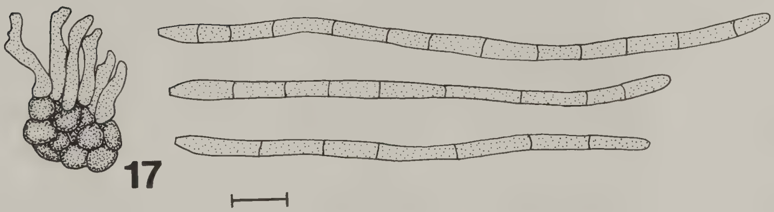
This species was observed to have olivaceous conidia by Chupp (1954). Guo & Liu (1992), redisposed it in *Pseudocercospora*. However, as they did not examine the holotype, we herewith include a description and illustration made from the type specimen.

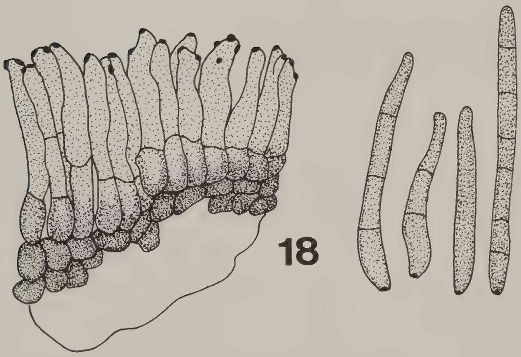
A homonym of *C. pouzolziae* was described by Sawada, but renamed *Cercospora mysoriensis* Thirum. & Chupp (Chupp, 1954), which is now also placed in *Pseudocercospora* (Deighton, 1976).

118. ***pretoriensis*** *Cercospora* Chupp & Doidge, *Bothalia* **4**: 890 (1948).

Specimens: Transvaal, Pretoria, Arcadia, *Gomphrena globosa* (Amaranthaceae), ?, 14 Apr. 1913, PREM 6593 (holotype); Transvaal, Pretoria, Arcadia, *G. globosa*, E.M. Doidge, Dec. 1909, PREM 775 (paratype); Transvaal, Pretoria, *G. globosa*, E.M. Doidge & A.M. Bottomley, 30 Nov. 1936, PREM 32789; Transvaal, Pretoria, Donkerpoort, *G. globosa*, E.M. Doidge & A.M. Bottomley, 27 Apr. 1937, PREM 32767; Transvaal, Schagen, Nelspruit, *G. globosa*, L.C.C. Liebenberg, Mar. 1932, PREM 26316; Transvaal, Pretoria, Skinners Court, *G. globosa*, 29 Nov. 1911, PREM 1937.


16


17


18

Figs 16-18. Conidiophores and conidia of *Pseudocercospora pouzolziae*, *P. punctiformis* and *Passalora verbeniphila* (bar = 10 µm). Fig. 16. *P. pouzolziae* (PREM 26013). Fig. 17. *P. punctiformis* (PREM 6642). Fig. 17. *P. verbeniphila* (PREM 41443).

This species has hyaline conidia with thickened hila, and dark, fasciculate conidiophores with thickened, refractive scars, confirming its status in *Cercospora*. Other South African collections of *Cercospora gomphrenicola* Speg. have been allocated to *C. pretoriensis*.

119. ***primulae*** *Ramularia* Thüm., *Oest. Bot. Zeitschr.* **28**: 147 (1878).

This species is reported by Doidge (1950) to occur on *Primula polyantha* (Primulaceae), but no specimens could be located at PREM.

120. ***proteae*** *Batcheloromyces* Marasas, van Wyk & Knox-Dav., *J. S. Afr. Bot.* **41**: 43 (1975).

Stigmina proteae (Marasas, van Wyk & Knox-Dav.) B. Sutton & Pascoe, *Mycol. Res.* **92**: 214 (1989).

Specimen: Cape Province, Stellenbosch, *Protea cynaroides* (Proteaceae), S. van Wyk, 15 Aug. 1973, PREM 44850 (holotype).

Batcheloromyces Marasas, van Wyk & Knox-Davies (1975) was proposed as a new genus of dematiaceous hyphomycetes characterized by sporodochial conidiomata with short, integrated, discrete conidiogenous cells giving rise to conidia by percurrent proliferation. The dark brown, verrucose conidia and conidiogenous cells with their irregular annellations make this a typical *Stigmina sensu strictu* as stated by Sutton & Pascoe (1989), who did not observe conidia to form in chains. However, an examination of fresh material showed that conidia are found in chains of two on older lesions, with several conidia having marginal frills at both ends. Sutton & Pascoe (1989) were correct in stating, however, that conidia could be 0(-1)-septate. *Batcheloromyces* should therefore be retained as a monotypic genus distinguished from *Stigmina* by having conidia in chains.

121a. ***protearum*** *Cercostigmina* var. *hakeae* U. Braun & Crous, *Sydowia* **46**: 206 (1994).

Specimen: Transvaal, Louis Trichardt, Hangklip Forest Station, *Hakea saligna* (Proteaceae), C. Roux, Apr. 1988, PREM 51117 (holotype).

121b. ***protearum*** *Cercostigmina* (Cooke) U. Braun & Crous var. *protearum*, *Sydowia* **46**: 206 (1994).

Cercospora protearum Cooke var. *leucospermi* Cooke, *Grevillea* **12**: 39 (1883).

Stigmina protearum (Cooke) M.B. Ellis var. *protearum*, *Mycol. Pap.* **131**: 6 (1972).

Specimens: Cape Province, Kirstenbosch, *Leucospermum reflexum* (Proteaceae), P.S. van Wyk, 7 Jun. 1972, PREM 44848; Cape Province, Betty's Bay, *L. conocarpodendron*, P.S. van Wyk, 26 Mar. 1973, PREM 44847; Cape Province, Cape Town, behind St. James, *L. conocarpum*, J.B. Pole Evans, 22 Dec. 1912, PREM 5570; Cape Province, *L. conocarpum*, J.B. Pole Evans, May 1883, PREM 3929.

121c. *protearum* *Cercostigmina* var. *leucadendri* (Cooke) U. Braun & Crous, *Sydowia* 46: 206 (1994).

Cercospora protearum Cooke var. *leucadendri* Cooke, *Grevillea* **12**: 39 (1883).
Stigmina protearum var. *leucadendri* (Cooke) M.B. Ellis, *Mycol. Pap.* **131**: 7 (1972).

Specimen: Cape Province, Kirstenbosch, *Leucadendron argenteum* (Proteaceae), H. Pearson, 27 May 1914, PREM 8354.

122. *pseudarthriae* *Pseudocercospora* (Petch) Deighton, *Mycol. Pap.* 140: 151 (1976).

Cercospora pseudarthriae Petch, *Ann. Roy. Bot. Gard. Peradeniya* **6**: 250 (1917).

Specimen: Transvaal, Nelspruit, Schagen, *Pseudarthria hookeri* Wight & Arn. var. *hookeri* (Fabaceae), L.C.C. Liebenberg, 13 Jul. 1936, PREM 32886.

Leaf spots amphigenous, round to irregular, chlorotic yellow on lower surface, appearing yellow to red-brown on upper surface, not clearly delimited, 5-15 cm diam. *Mycelium* internal and external, olivaceous, smooth, 2-5 µm diam. *Caespituli* hypophyllous, stroma absent. *Conidiophores* unbranched, separate on secondary mycelium, smooth to verruculose, olivaceous, cylindrical, straight to geniculate-sinuous, 1-3-septate, 25-40 x 5-6 µm. *Conidiogenous cells* terminal, unbranched, olivaceous, cylindrical, tapering to an obtuse apex, polyblastic, 10-20 x 5-6 µm. *Conidia* solitary, olivaceous, verruculose, 0-6-septate, straight to curved, subcylindrical with an obtuse apex and obconically truncate base, 22-60 x 4-7 µm.

Because neither Chupp (1954) nor Deighton (1976) redescribed this species, a description based on the type specimen lodged at K (Ceylon, Peradeniya, *Pseudarthria viscida*, T. Petch No 4096, 30 Dec. 1913) is given above. The morphology of the local collection closely matches that of the type. *P. pseudarthriae* is a new record for South Africa.

123. ***pseudokalanchoes*** *Cercospora* Crous & U. Braun, *Sydowia* **46**: 205 (1994).

Specimen: Transvaal, Louis Trichardt, Hangklip Forestry Station, *Kalanchoe rotundifolia* (Crassulaceae), R.Y. Anelich, Apr. 1988, PREM 51121 (holotype).

124. ***psychotriicola*** *Pseudocercospora* (Chupp & Doidge) Crous & U. Braun, *Sydowia* **46**: 216 (1994).
Cercospora psychotriicola Chupp & Doidge, *Bothalia* **4**: 891 (1948).

Specimens: Transvaal, Nelspruit, Mambatini Forest, *Psychotria capensis* (Rubiaceae), A.O.D. Mogg, 31 Mar. 1938, PREM 32773 (holotype); Northern Transvaal, Entabeni State Forest, Levubu, *P. capensis*, R.Y. Anelich, Apr. 1988, PREM 51119.

Presently three *Cercospora* species have been descibed from *Psychotria* (Chupp, 1954), of which one, *C. psychotriae* Chupp & Viégas, occurs in Brazil (Viégas, 1945). However, the description given by Chupp (1954) suggests that this is not a species of *Cercospora*, as conidia were pale olivaceous. Furthermore, Viégas (1945) illustrated catenulate conidia. Hsieh & Goh (1990) distinguished *C. psychotriae* from the earlier described *C. psychotriae* Sawada (nom. nud., Art 36.1) by its non-fasciculate conidiophores. The same criterion can also be used to separate *C. psychotriae* Chupp & Viégas from *Pseudocercospora psychotriicola* (Chupp & Doidge) Crous & U. Braun. In an examination of the type specimen of *C. psychotriae* Chupp & Viégas lodged at Campinas in Brazil, conidiophores were found to be non-fasciculate, and the catenulate conidia olivaceous. Furthermore, the mycelium is mostly superficial, branched, brown and verruculose, suggesting that this collection would be better accommodated in *Stenella* Syd. The following new combination is therefore proposed: *Stenella psychotriae* (Chupp & Viégas) Crous & U. Braun comb. nov. [*Cercospora psychotriae* Chupp & Viégas *Bol. da Soc. Brasil de Agron.* **8**: 45 (1945) basionym; non *Cercospora psychotriae* Sawada *Taiwan Agric. Res. Inst. Rept.* **87**: 86-87 (1944) nom. nud.].

Lesions amphigenous, discrete, circular to angular, pale to medium brown, bordered by a thin black line, 2-12 mm diam. *Mycelium* mostly superficial, brown, verruculose, stroma absent. *Conidiomata* hypophyllous, non-fasciculate. *Conidiophores* arising from stomata, or forming on superficial hyphae; separate, erect, olivaceous-brown, verruculose, straight or once geniculate, 1-4-septate, 10-60 x 2.5-5 µm. *Conidia* olivaceous, verruculose, cylindrical to obclavate, straight or curved, 1-6-septate, formed singly or in chains of 2, apex obtuse and base obconically truncate, frequently anastomosing, 15-125 x 2.5-5 µm.

Specimen: BRAZIL; Sao Paulo, Campinas, *Psychotria* sp., A.P. Viégas, 23 Nov. 1941, SP 2644 (holotype).

125. ***pulviniformis*** *Stigmina* (Syd.) Hughes, *Mycol. Pap.* **49**: 24 (1952).
Brachysporium pulviniforme Syd., *Ann. Mycol., Berl.* **12**: 267 (1914).

Specimens: Cape Province, Cape Town, St. James, *Rhus tomentosa* (Anacardiaceae), G.B. Pole Evans, 22 Dec. 1912, IMI 37988 (holotype), PREM 5575 (isotype); Cape Province, Wellington, *Rhus* sp., E.M. Doidge, 11 Nov. 1910, PREM 71039.

126. ***punctata*** *Pseudocercospora* (Wakefield) B. Sutton, *Mycol. Res.* **97**: 123-126 (1993).
Septogloeum punctatum Wakefield, *Bull. Misc. Inf., Kew.* **4**: 204 (1931).

Specimen: Natal, Durban, *Eugenia cordata* (Myrtaceae), P.A. van der Bijl 323, holotype in Kew.

127. ***punctiformis*** *Pseudocercospora* Goh & W.H. Hsieh, *Cercospora and similar fungi from Taiwan*, p. 35 (1990).
Cercospora punctiformis Sacc. & Roum., *Rev. Mycol.* **3**: 29 (1881).
Cercospora vincetoxici Ellis & Everh., *J. Mycol.* **8**: 70 (1902), homonym. Fig. 17.

Leaf spots predominantly epiphyllous, circular, medium brown, 4-15 mm diam. *Mycelium* internal. *Caespituli* predominantly epiphyllous, arising from brown stromata, up to 50 µm wide, and 35 µm high. *Conidiophores* arising from stromata, arranged in rich fascicles, reduced to conidiogenous cells. *Conidiogenous cells* fasciculate, olivaceous, smooth, tapering to a conic tip, cylindric to geniculate-sinuous, proliferating sympodially, 10-35 x 3-5 µm; conidial scars unthickened. *Conidia* olivaceous, solitary, smooth, obclavate to cylindric, with an obtuse apex and long obconic base, straight or mildly curved, indistinctly 3-10-septate, 20-100 x 3-5 µm; conidial hila unthickened.

Specimen: Natal, Isipingo, *Cynanchum natalitium* (Asclepiadaceae), E.M. Doidge, 13 May 1913, PREM 6642.

Hsieh & Goh (1990) described *P. punctiformis* as a new species from *Cynanchum formosanum*. The Taiwan material closely resembles that found in South Africa. The latter, however, was originally described as *Cercospora punctiformis* Sacc. & Roum. Unfortunately this material was not checked by Hsieh & Goh (1990). To reallocate the South African collection to *Pseudocercospora* would now give rise to a later homonym. *P. punctiformis* Goh & W.H. Hsieh is valid, however, and should be accepted.

128. ***purpurea*** *Pseudocercospora* (Cooke) Deighton, *Mycol. Pap*. **140**: 151 (1976).
Cercospora purpurea Cooke, *Grevillea* **7**: 34 (1878).

Darvas & Kotzé (1987) reported this species to be responsible for causing a postharvest disease on fruit of *Persea americana* Mill. in the Northern Transvaal.

129. ***resedae*** *Cercospora* Fuckel, *Hedwigia* **5**: 30 (1866).
Virgasporium maculatum Cooke, *Grevillea* **3**: 182 (1874).
Cercospora resedae var. *luteae* Lobik, *Bolezni Rast*. **17**: 195 (1928).

Specimens: Transvaal, Barberton, *Reseda odorata* (Resedaceae), 30 Dec. 1907, PREM 7439; Cape Province, Kentani, *Reseda* sp., A. Pegler, 1916, PREM 9428.

Foreign specimens: Syd., Mycotheca Germanica, *R. lutea*, A. Ludwig, 4 Sept. 1922, PREM 17639; Sacc., Mycotheca Veneta, *R. odorata*, Oct. 1877, PREM 6220; Briosi & Cavara, *R. odorata*, 1888, PREM 7915; ?, *R. odorata*, P. Vogel, 20 Sept. 1913, PREM 18249.

Chupp (1954) also refers to a *Cercospora resedae* var. *mahonensis* Fragoso (*in litt.*) as an additional synonym of *C. resedae*, and Pollack (1987) cites the variety *C. resedae* var. *legionensis* Losa Espana, which was not examined by Chupp.

130. *rhapontici* *Cercospora* Tehon & Daniels, *Mycologia* **17**: 248 (1925).

Although this species was reported from *Rheum raponticum* L. by Doidge *et al.* (1953), no reference specimen could be located at PREM.

131. *rhoicissi* *Pseudocercospora* (Syd. & P. Syd.) Deighton, *Mycol. Pap.* **140**: 152 (1976).
Cercospora rhoicissi Syd. & P. Syd., *Ann. Mycol.* **10**: 444 (1912).

Specimens: Transvaal, Barberton, *Rhoicissus erythroides* (Vitaceae), C.P. Lounsbury, Mar. 1911, PREM 1275 (holotype); Transvaal, Pisanghoek, Zoutpansberg, *R. cuneifolius*, M. Bosman, 2 Jun. 1929, PREM 32898; Transvaal, Uitkyk farm nr. Nelspruit, *Rhoicissus* sp., B. Grobbelaar, 20 Mar. 1993, PREM 51652.

132. *riachueli* *Pseudocercospora* (Speg.) Deighton, *Mycol. Pap.* **140**: 129-131 (1976).
Cercospora riachueli Speg., *Anal. Soc. Cient. Argentina* **10**: 38 (1880).
Cercospora horiana Togashi & Katsuki, *Sci. Repts. Yokohama Nat. Univ. Sect. II*, **1**: 4 (1952).

Specimen: Transvaal, Schagen, Nelspruit, *Cissus* sp. (Vitaceae), Mar. 1932, PREM 26178.

133. *rhois* *Stigmina* Crous & U. Braun, *Sydowia* **46**: 221 (1994).

Specimen: Natal, Mahai Gorge, Royal Natal National Park, *Rhus discolor* (Anacardiaceae), R.Y. Anelich, May 1988, PREM 51132 (holotype).

134. *richardiae* *Ramularia* Kalchbr., *Grevillea* **8**, 23 (1880).
(= anamorph of *Leveillula taurica* (Lév.) Arn.).

Specimen: Cape Province, Somerset East, *Richardia albomaculata*, (Rubiaceae), P. Mac Owen, 1875, PREM 22017.

Braun (1990) examined the type, and found it to represent the anamorph state of *Leveillula taurica* (Lév.) Arn., and to not be a species of *Ramularia*.

135. *richardiicola* *Cercospora* G.F. Atk., *J. Elisha Mitchell Sci. Soc.* **8**: 51 (1892) (as "*richardiaecola*").

Specimens: Cape Province, Knysna, Tzitzikama Park, *Zantedeschia aethiopica* (Araceae), L.C.C. Liebenberg, 31 Jan. 1966, PREM 7885; Natal, Pietermaritzburg, *Zantedeschia* sp., C. Schmutz, 27 Feb. 1938, PREM

30098; Transvaal, Pretoria, *Zantedeschia* sp., A. M. Bottomley, 15 Feb. 1921, PREM 14269-14271.

Foreign specimen: Zimbabwe, Harare, *Z. melansleuca*, Townsend, 25 Feb. 1930, PREM 34261.

136. ***ricinella*** *Cercospora* Sacc. & Berl., *Atti Ist. veneto Sci.* **6**: 721 (1885).

Specimen: Transvaal, Barberton, *Ricinus* sp. (Euphorbiaceae), L.C.C. Liebenberg, May 1931, PREM 26010.

Foreign specimens: Tanganyika, Mwika, *R. communis*, 16 May 1927, PREM 43797, IMI 8011; Herb. Mycol., Bogota, Colombia, *R. communis*, G.J. Quintana, 24 Sept. 1938, PREM 645; Syd., Fungi Exotici Exsiccati, Ceylon, Peradeniya, *R. communis*, T. Petch, Dec. 1913, PREM 15407; Rabenh.-G. Winter, Fungi Europaei, *R. communis*, C.H. Demetrio, 1883, PREM 3927.

137. ***robbenensis*** *Stigmina* Crous, C.L. Lennox & B. Sutton, *Mycol. Res.*: in press (1995).

Specimen: Cape Province, Robben Island, *Eucalyptus* sp. (Myrtaceae), Sept. 1993, C.L. Lennox, PREM 51730.

138. ***rosicola*** *Passalora* (Pass.) U. Braun, *Mycotaxon* **54**: in press (1995).

Cercospora rosicola Passerini, *Just's Bot. Jahresber.* **3**: 276 (1877) (as *rosaecola*).
Cercospora rosigena Tharp, *Mycologia* **9**: 114 (1917).
Cercospora rosaecola var. *undosa* Davis, *Wisc. Acad. Trans.* **20**: 405 (1921).
Cercospora rosae van Hook, *Ind. Acad. Sci. Proc.* **38**: 131 (1929).
Cercospora rosae-indiananensis van Hook, *Ind. Acad. Sci. Proc.* **39**: 82 (1930).
Holomorph: *Mycosphaerella rosicola* Davis *ex* Deighton, *Trans. Br. mycol. Soc.* **50**: 328.
Phaeosporella rosicola (Davies *ex* Deighton) Tomilin, *Key to fungi of the genus Mycosphaerella Johans.* p. 285 (1979).

Specimens: Transvaal, Pretoria, Roodeplaat Experimental Station, *Rosa* sp. (Rosaceae), B.H. Boelema, May 1972, PREM 44700, Jul. 1972, PREM 44701; Natal, Harding, *Rosa* sp., H.G. Lennox, 17 Mar. 1947, PREM 35606.

Foreign specimens: Briosi & Cavara, *Rosa* sp., 1888, PREM 7867; Sacc. Mycotheca Veneta, *Rosa* sp., Oct. 1877, PREM 6219; Herbario Micologica, Colombia, *Rosa* sp., C. Garces, 15 Aug. 1939, PREM 32857.

139. *rubi* *Pseudocercospora* (Sacc.) Deighton, *Mycol. Pap.* **140**: 152 (1976).

Cercospora rubi Sacc., *Nouv. Giorn. Bot. Ital.* **8**: 188 (1876).
Cercospora septorioides Ellis & Everh., *Field Columb. Mus. Bot. ser.* **1**: 94 (1896).
Cercospora garbiniana Massalongo, *Atti Mem. Acad. Agr. Sci. Lett. Verona ser. 4.*, **3**: 147 (1902).
Holomorph: *Mycosphaerella confusa* Wolf, *Mycologia* **28**: 85 (1936).
Mycosphaerella dubia Wolf *nom. illegit.*

Specimens: Natal, Richmond, *Rubus fructicosus* (Rosaceae), M.J. Morris, 26 Dec. 1980, PREM 45912; Natal, Banhoek, Dwarsrivierhoek, *R. fruticosus*, M.J. Morris, 13 Jul. 1980, PREM 45911.

Foreign specimen: Australia, N.S.W., Baulkham Hills, *R. vulgaris*, J. Walker, 29 May 1965, PREM 45241.

Pseudocercospora rubi also has secondary mycelium that can colonise leaf hairs, and give rise to separate, single conidiophores. The foreign specimen PREM 45241 is distinct from the local collections in having wider, shorter conidia, and wider conidiophores.

140. *rubro-tincta* *Passalora* (Ellis & Everh.) U. Braun, *Mycotaxon* **54**: in press (1995).

Cercospora rubro-tincta Ellis & Everh., *J. Mycol.* **3**: 20 (1887).
Cercospora consobrina Ellis & Everh., *J. Mycol.* **3**: 19 (1887).
Cercospora guliana Sacc., *Ann. Mycol.* **11**: 565 (1913).
Cercospora amygdali Riza, *Bull. Soc. Mycol. Fr.* **36**: 191 (1920).

Specimens: Transvaal, Klerksdorp, Rhenosterspruit, *Prunus communis* (Rosaceae), C. Badenhorst, 15 Mar. 1910, PREM 7779; Transvaal, Barberton, Louwscreek, *P. communis*, J. Bradbury, 1 Nov. 1929, PREM 24891; Cape Province, Knysna, *P. communis*, 12 Feb. 1930, PREM 34279; Cape Province, Sundays River Valley, Kirkwood, *P. communis*, Dr Knights-Rayson, Jan. 1933, PREM 26634; Cape Province, Stellenbosch, *P. communis*, Jan. 1929, PREM 34378; Cape Province, Stellenbosch, *P. communis*, L. Verwoerd, Dec. 1928, PREM 46327; Cape Province, Stellenbosch, *P. communis*, B.J. Dippenaar, Jan. 1929, PREM 46809; Cape Province, Knysna, *P. communis*, Reinecke, 12 Feb. 1930, PREM 46827.

141. *rumicis* *Ramularia* Kalchbr. & Cooke, *Grevillea* **8**: 23 (1880).

Ramularia decipiens Ellis & Everh., *J. Mycol.* **1**: 70 (1885).

Specimen: Cape Province, Somerset East, *Rumex obtusifolius* (Polygonaceae), MacOwen No. 1180, B (lectotype) and K (lectoisotype).

142. ***scitula*** *Pseudocercospora* (H. Syd.) Deighton, *Mycol. Pap.* **140**: 152 (1976).
Cercospora scitula Syd., *Ann. Mycol.* **33**: 236 (1935).

Specimen: Transvaal, Barberton, Nelspruit Research Station, *Annona sengalensis* (Annonaceae), L.C.C. Liebenberg, Apr. 1931, PREM 26027.

143. ***scolopiae*** *Paracercospora* Crous & U. Braun, *Mycol. Res.* **99**: 33 (1995).

Specimen: Northern Transvaal, Louis Trichardt, *Scolopia zeyheri* (Flacourtiaceae), R.Y. Anelich, Apr. 1988, PREM 51122 (holotype).

144. ***sesami*** *Cercospora* Zimm., *Ber. Land.-Forst. Deut.-Ostafr.* **2**: 28 (1904).

Specimens: Natal, Zululand, *Ceratotheca triloba* (Pedaliaceae), P.S. Knox-Davies, 22 Jul. 1955, PREM 41442; Transvaal, Nelspruit, *C. triloba*, L.C.C. Liebenberg, Mar. 1932, PREM 26179; Transvaal, Barberton, Nelspruit Research Station, *Pretrea zanguebarica*, L.C.C. Liebenberg, Apr. 1931, PREM 26048.

Foreign specimen: Fungi Malayana C.F. Baker, Philippines, *Sesamum indicum*, Jan. 1914, PREM 9333.

145. ***sorghi*** *Cercospora* Ellis & Everh., *J. Mycol.* **3**: 15 (1887).
Cercospora sorghi var. *maydis* Ellis & Everh., (Langlois 613).
Cercospora andropogonis Sawada, *nom. nud.* (Goh & W.H. Hsieh, 1990).

Specimens: Transvaal, Pretoria, Grasfontein, Wolwekop, *Cymbopogon excavatus* (Poaceae), 22 Feb. 1929, PREM 29953; Transvaal, Nelspruit, *C. excavatus*, L.C.C. Liebenberg, 21 Jul. 1936, PREM 32910; Transvaal, Nelspruit Research Station, *C. afronardus*, L.C.C. Liebenberg, Apr. 1931, PREM 26061.

Chupp (1954) states that he examined South African material collected from *Cymbopogon excavatus* Stapf. (*Andropogon schoenanthus* var. *versicolor* Steud.) and *Cymbopogon afronardus* Stapf. Pollack (1987) also lists a var. *cymbopogonis* Govindu & Thirumalachar, described from *Cymbopogon caesium* in India. In the description of Govindu & Thirumalachar (1954), the authors distinguish this variety from *R. sorghi* by the uniseptate conidiophores and poorly developed stroma. The illustration shows conidiophores to be strongly fasciculate, with darkened, refractive conidiogenous loci, agreeing with that of Ellis (1976).

Chupp (1954) mentions the possibility that the var. *maydis* may prove to be different from the strains on *Sorghum* due to negative results obtained in pathogenicity studies.

146. *stizolobii* *Pseudocercospora* (Syd. & P. Syd.) Deighton, *Mycol. Pap.* **140**: 153 (1976).

Cercospora stizolobii Syd. & P. Syd., *Ann. Mycol.* **11**: 270 (1913).
Cercospora lussoniensis Sacc., *Ann. Mycol.* **12**: 314 (1914).
Cercospora mucunae-ferrugineae Yamamoto, *Trans. Sapporo Nat. Hist. Soc.* **13**: 141 (1934).
Cercospora mucunae-capitatae Sawada, *Formosa Agr. Res. Inst. Rept.* **85**: 116 (1943).

Specimen: Transvaal, Barberton, *Stizolobium deeringianum* (Fabaceae), G.J.M.A. Gorter, 11 Apr. 1956, PREM 41548.

Foreign specimens: Zimbabwe, Harare, *S. deeringianum*, J.C. Hopkins, 8 Apr. 1941, PREM 33969; Fungi Malayana C.F. Baker, *S. deeringianum*, Nov. 1913, PREM 11397.

147. *timorensis* *Pseudocercospora* (Cooke) Deighton, *Mycol. Pap.* **140**: 154 (1976).

Cercospora timorensis Cooke, *Grevillea* **12**: 38 (1883).
Ramularia batatae Raciborski, *Paras. Algen. v. Pilze Javas* **1**: 35, Batavia (1900).
Cercospora batatae Zimm., *Ber. Land.-Forstw. Deutsch. Ostafr.* **2**: 28 (1904).
Cercospora batatae P. Henn., *Bot. Jahrb. von Engler* **38**: 118 (1907).

Specimen: Natal, Gilletts, *Ipomoea cymosa* (Convolvulaceae), V.A. Wager, 1956, PREM 41659.

148. *transvaalensis* *Pseudocercospora* (Syd.) Deighton, *Mycol. Pap.* **140**: 154 (1976).

Cercospora transvaalensis Syd. *Ann. Mycol.* **33**: 237 (1935).

Specimen: Transvaal, Barberton, Nelspruit Research Station, *Acalypha petiolaris* (Euphorbiaceae), L.C.C. Liebenberg, May 1931, PREM 26002 (holotype).

149. *tripolitana* *Cercospora* Sacc. & Trotter, *Ann. Mycol.* **11**: 419 (1913).

Cercospora barrasii Frag., *Trab. Mus. Nac. Cien. Nat. Madrid Ser. Bot.* **9**: 68 (1916).

Cercospora emicis Pat., in Pitard, *Contribution à l' étude de la flore du Maroc*, p. 73 (1931).

Specimen: Cape Province, Alexandria, Addo National Park, *Emex australis* (Polygonaceae), B.A. Louwrens, Jul. 1962, PREM 42546.

Cercospora tripolitana is a new record for South Africa.

150. *vaginae* *Mycovellosiella* (Krüger) Deighton, *Mycol. Pap.* **144**: 26 (1979).

Cercospora vaginae Krüger, *Ber. Vers. Stat. Zuckerr. West Java.* **1**: 64 (1890).

Doidge (1950) reports this species on *Saccharum officinarium* (Poaceae). No material could be located at PREM.

151. *verbeniphila* *Passalora* (Speg.) Crous & U. Braun comb. nov. Fig. 18.

Cercospora verbeniphila Speg., *Bol. Acad. Nac. Cienc. Repub. Argentine* **29**: 179 (1926).

Leaf spots irregular on leaves, elliptic on stems (2-4 mm diam.), dark brown to black on stems, yellow-brown on leaves. *Mycelium* internal. *Caespituli* hypophyllous, brown, up to 70 µm wide and 60 µm high, forming on well developed stromata. *Conidiophores* fasciculate, arising from stromata, fascicles rich and dense, conidiophores 15-40 x 3-5 µm, brown, smooth, tapering to a rounded apex, straight, 0-1-septate. *Conidiogenous cells* olivaceous brown, straight, with conspicuous, very slightly thickened, somewhat darkened, refractive, terminal conidial scars, 10-25 x 3.5-4 µm. *Conidia* olivaceous, obclavate, straight to slightly curved, 2-6-septate, base obconically truncate, apex rounded, 2.5-4 x 20-60 µm, hila very slightly thickened, somewhat darkened.

Specimen: Natal, Pietermaritzburg, *Verbena bonariensis* (Verbenaceae), P.S. Knox-Davies, 10 Jun. 1955, PREM 41443.

The pale olivaceous conidia with somewhat thickened hila, and conidiogenous cells with slightly thickened, refractive scars place this species in *Passalora*.

152. *verruculosa* *Camptomeris* (Syd.) Bessey, *Mycologia* **45**: 373 (1953) Fig. 19.

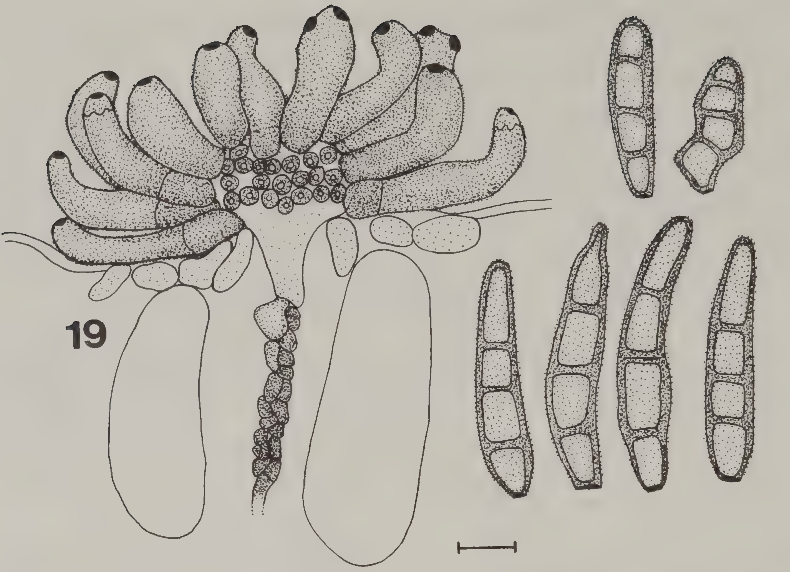
Stigmina verruculosa Syd., *Ann. Mycol.* **10**: 444 (1912).

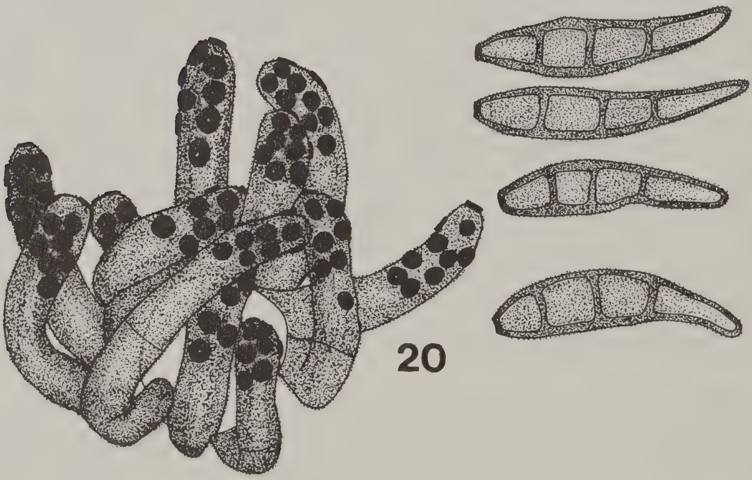
Leaf spots pale to light brown, irregular, amphigenous, up to 3 mm in diam. *Mycelium* internal, hyphae hyaline to pale olivaceous, septate, up to 3 µm wide, giving rise to fructifications situated over stomata. *Fructifications* amphigenous, arising from pseudoparenchymatal cells in the substomatal cavity, punctiform, round in diameter, brown, forming a subhyaline vesicular cell up to 40 µm in diam., giving rise to conidiophores, attached to round, refractive scars on the vesicle. *Conidiophores* straight, verruculose, becoming curved at the apex, medium brown to brown, cylindrical with an obtuse apex, 0-1(-2)-septate, 20-60 x 9-12 µm. *Conidiogenous cells* terminal, medium brown, verruculose, cylindrical, straight, or strongly curved if on lateral conidiophores, 20-30 x 9-12 µm, with 3 apical, thickened, darkened, refractive, slightly protruding conidial scars. *Conidia* solitary, simple, obclavate with an obtuse apex and obconically truncate base, straight to slightly curved, medium brown, verruculose, 1-4-distoseptate, 15-50 x 6-10 µm, with a thickened, refractive, darkened hilum.

Specimens: Natal, Harden Heights, Umvoti, *Acacia mearnsii* (as *A. mollissima*) (Fabaceae), J.B. Pole Evans, 11 Apr. 1911, PREM 1382, ex Herb. Syd. at S (holotype); Natal, Harden Heights, *A. mearnsii*, J.B. Pole Evans, 13 Feb. 1913, PREM 5647; Natal, Seven Oaks, *Acacia* sp., J.B. Osborn, 14 Mar. 1928, PREM 23199; Cape Province, Cape Flats, *A. saligna*, M. Morris, 14 Oct. 1985, PREM 49004; Natal, Sutton, Ixopo, *A. mearnsii*, M.J. Wingfield, 8 Apr. 1986, PREM 49005.

Hughes (1952) regarded *Stigmina verruculosa* as a synonym of *Camptomeris albizziae* (Petch) Mason. However, he refrained from making the new combination. Bessey (1953) stated that Hughes was incorrect in regarding the two fungi as synonymous, as conidiophores of *C. albizziae* usually bore several conidia, compared to that of *C. verruculosa* which rarely bore more than one.

An examination of the types of these two fungi in the present study confirmed them to be distinct. In *Camptomeris albizziae* the fructifications appear looser than those of *C.*


19


20

Figs 19, 20. Conidiophores and conidia of *Camptomeris* spp. (bar = 10 μm). Fig. 19. *C. verruculosa* (PREM 1382). Fig. 20. *C. albizziae* (K 2589).

verruculosa, the conidiophores are also longer, and have more and slightly wider scars on the conidiogenous cells (Fig. 20). Furthermore, the conidiophores and conidia are darker in colour, and the conidia also have a more prominent apical taper than those of *C. verruculosa*. It may be possible that *C. verruculosa* is restricted to South Africa, where it occurs quite commonly on *Acacia mearnsii*.

153. ***violae*** *Cercospora* Sacc., *Nuov. Giorn. Bot. Ital.* **8**: 187 (1976).

Cercospora violae-tricoloris Briosi & Cavara, *Atti Ist. Bot. Pavia.* **2**: 285 (1892).
Cercospora violae var. *minor* Rota-Rossi, *Atti Ist. Bot. Pavia. ser.* **2**. 13: 199 (1914).
Cercospora kiusana Sawada, *Formosan Agr. Res. Inst. Rept.* **85**: 126 (1943).
Cercospora difformis Tehon, *Mycologia* **40**: 322 (1948).

Specimens: Transvaal, Pretoria, Sunnyside, *Viola odorata* (Violaceae), J.B. Pole Evans, 26 May 1913, PREM 6678; Cape Province, Stellenbosch, *V. odorata*, L. Verwoerd, Mar. 1927, PREM 46270; Cape Province, Alexandria, Addo National Park, *V. odorata*, L.C.C. Liebenberg, Jul. 1962, PREM 43138; Transvaal, Pretoria, *Viola* sp. P.H.B. Talbot, Jun. 1952, PREM 40486; Cape Province, Knysna, *V. odorata*, Laughton, ?, PREM 34216; Transvaal, *V. odorata*, A. Hean, 16 Nov. 1940, PREM 33490; Transvaal, *V. odorata*, A.M. Bottomley, 14 Apr. 1942, PREM 33444; Natal, Donnybrook, Hopevale, *V. odorata*, Morgan, 12 May 1936, PREM 28610; Cape Province, Fort Hare, Lyle, 4 Apr. 1930, PREM 25422; Transvaal, Potchefstroom, *V. odorata*, ?, 1925, PREM 23495; Cape Province, *V. odorata*, G. Imraef, 4 Aug. 1927, PREM 22343; Transvaal, Pretoria, *V. odorata*, V.A. Wager, 2 May 1927, PREM 21580; Natal, Cramond, *V. odorata*, J.B. Pole Evans, 11 Apr. 1911, PREM 1497; Transvaal, Pretoria, Faures Garden, *V. odorata*, 4 Jan. 1904, PREM 884; Cape Province, Claremont, *V. odorata*, ?, PREM 741; Transvaal, Barberton, ?, 20 Dec. 1907, PREM 440.

Foreign specimens: Zimbabwe, Harare, *V. odorata*, G. Mitchell, 17 May 1930, PREM 34264; Krieger Schädliche Pilze, Krieger, 1876, PREM 21740; Zimbabwe, Harare, *V. odorata*, F. Eyles, Feb. 1920, PREM 14015; Mozambique, *V. odorata*, C.W. Howard, 16 Jan. 1909, PREM 651; Briosi & Cavara No. 185, *V. tricolor*, 1891, PREM ?.

154. *vitis Pseudocercospora* (Lév.) Speg., *An. Mus. nac. Hist. nat. B. Aires* **20**: 438 (1910).

Septonema vitis Lév., *Ann. Sci. nat., Bot., ser. 3*, **9**: 261 (1848).
Cladosporium vitis (Lév.) Sacc., *Mycol. venet. n.* 284 (1875).
Cercospora vitis (Lév.) Sacc., *Nuovo G. bot. ital.* **8**: 188 (1876).
Helminthosporium vitis (Lév.) Pirotta, *Rev. Mycol.* **11**: 185 (1889).
Phaeoisariopsis vitis (Lév.) Sawada, *Rep. Dep. Agric. Govt. Res. Inst. Formosa* **2**: 164 (1922).
Cercosporiopsis viticolum Ces., *Flora* **38**: 206 (1854).
Cercospora viticola (Ces.) Sacc., *Syll. Fung.* **4**: 458 (1886).
Cladosporium ampelinum Pass., *Erb. critt. ital. ser. 2, n.* 595 (1872).
Graphium clavisporium Berk. & Cooke, *Grevillea* **3**: 100 (1874).
Isariopsis clavispora (Berk. & Cooke) Sacc., *Syll. Fung.* **4**: 631 (1886).
Cercospora vitis (Lév.) Sacc. var. *rupestris* Cif., *Ann. Mycol.* **20**: 45 (1922).
Holomorph: *Mycosphaerella personata* Higgins, *Am. J. Bot.* **16**: 287 (1929).

Specimens: Transvaal, Rustenburg, Buffelspoort, *Vitis vinifera* (Vitaceae), A.M. Bottomley, 5 May 1939, PREM 32701; ?, *V. vinifera*, PREM 34493; Transvaal, Pretoria, *V. vinifera*, A.M. Bottomley, Mar. 1941, PREM 33489; Natal, *V. vinifera*, Jan. 1911, PREM 1087; Orange Free State, Modder River, *V. vinifera*, F. Dreyer, 11 Apr. 1907, PREM 283; Cape Province, Kingwilliamstown, *V. vinifera*, Mar. 1908, PREM 462; Transvaal, Middelburg, *V. vinifera*, 3 Mar. 1909, PREM 612; Cape Province, Kingwilliamstown, *V. vinifera*, Feb. 1911, PREM 1173; Cape Province, Kingwilliamstown, *V. vinifera*, C.W. Mally, 20 Feb. 1911, PREM 1182; Cape Province, Kentami, *V. vinifera*, A. Pegler, 26 May 1916, PREM 9740; Natal, Eshowe, *V. vinifera*, J.B. Pole Evans, 30 Jan. 1912, PREM 2025; Transvaal, Waterberg, Vaalwater, *Vitis* sp., J. Farrant, 27 Apr. 1939, PREM 30765; Transvaal, Pretoria, *V. vinifera*, A.M. Bottomley, 27 Nov. 1939, PREM 32636; Natal, Verulam, *Vitis* sp., James, 8 Jan. 1941, PREM 33299; Transvaal, Pretoria, *V. vinifera*, A.M. Bottomley, Jan. 1944, PREM 34046.

Foreign specimens: Flora Exsiccata Austro-Hungarica, *V. vinifera*, Thüm., PREM 22578, 4898; USA, Illinois, *V. vinifera*, Burrill, PREM 49977; Sacc. Mycotheca Veneta, *V. vinifera*, Sept. 1874, PREM 5733; Briosi & Cavara, *Vitis* sp., Nov. 1889, PREM 7946; Swaziland, Ezulweni, *Vitis* sp., S.A. Douglas, 25 Feb. 1932, PREM 26378.

155. *withaniae Pseudocercospora* (Syd. & P. Syd.) Deighton, *Mycol. Pap.* **140**: 155 (1976).

Cercospora withaniae Syd. & P. Syd., *Ann. Mycol.* **10**: 444 (1912).

Specimen: Natal, Durban, *Withania somnifera* (Solanaceae), E.M. Doidge, 7 Jul. 1911, PREM 1672 (holotype).

156. ***zeae-maydis*** *Cercospora* Tehon & Daniels, *Mycologia*. **17**: 248 (1925).

Gray leaf spot of maize has recently been reported from Natal by Gevers *et al.* (1994).

157. ***zinniae*** *Cercospora* Ellis & Martin, *J. Mycol.* **1**: 20 (1885).

Cercospora atricincta Heald & Wolf, *Mycologia* **3**: 14 (1911).
Cercospora zinniae Takah. & Yosh, *Plant Protect. Tokyo* **7**: 17 (1953) *nom. nud.*

Doidge (1950) lists this species on *Zinnia elegans* (Asteraceae). However, no specimen could be located at PREM.

158. ***zinniae*** *Ramularia* Crous & U. Braun, *Mycol. Res.* **99**: 35 (1995).

Specimen: Northern Transvaal, Louis Trichardt, Hangklip Forestry Station, *Zinnia peruviana* (Asteraceae), R.Y. Anelich, Apr. 1988, PREM 51130 (holotype).

159. ***zizyphi*** *Pseudocercospora* (Petch) Crous & U. Braun comb. nov.

Cercospora zizyphi Petch, *Ann. Roy. Bot. Gard. Peradeniya, Part 5*, **4**: 306 (1909).

Leaf spots circular, amphigenous, 2-4 mm diam., brown, with a light brown centre and dark brown margin. *Caespituli* predominantly epiphyllous, brown, up to 45 µm wide and 50 µm high, originating from stromata. *Conidiophores* situated on stromata, fasciculate or solitary on secondary mycelium; fascicles dense, rich, olivaceous, reduced to conidiogenous cells or a supporting cell. *Conidiogenous cells* terminal, olivaceous, smooth, cylindrical, tapering to a narrowly subtruncate apex, straight or geniculate-sinuous, sympodial, 15-40 x 3-4.5 µm. *Conidia* solitary, smooth, olivaceous, straight to mildly curved, 3-9-septate, obclavate with a subacute apex and obconically truncate base, 25-120 x 3-4.5 µm.

Specimens: Transvaal, Tzaneen, *Zizyphus mucronata* (Rhamnaceae), L.C.C. Liebenberg, Jun. 1939, PREM 32726; Transvaal, Nelspruit, *Z. mucronata*, L.C.C. Liebenberg, 12 Jul. 1936, PREM 32880; Transvaal, Schagen, Nelspruit, *Z. mucronata*, L.C.C. Liebenberg, 4 Jul. 1936, PREM 32876;

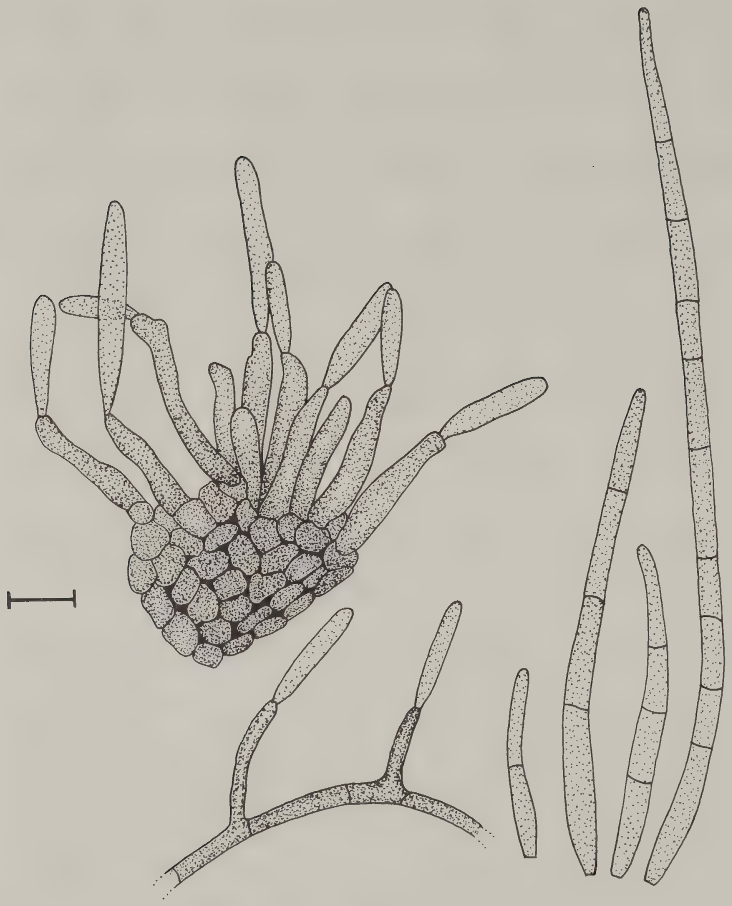


Fig. 21. Conidiophores and conidia of *Pseudocercospora zizyphi* (PREM 32726, bar = 10 µm).

Transvaal, Schagen, Nelspruit, *Z. mucronata*, L.C.C. Liebenberg, Apr. 1932, PREM 26347.

Chupp (1954) mentions that conidia of this species are subhyaline. An examination of the South African collections showed them to be better accommodated in *Pseudocercospora. P. zizyphi* has longer and wider conidia than *P. ziziphicola* (Yen) Yen occurring on *Zizyphus jujuba* in Taiwan (Hsieh & Goh, 1990).

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the assistance of Ms A.P. Baxter and I. Rong at the National Collection of Fungi, Pretoria (PREM) for placing specimens at our disposal for study. Profs. Mike Wingfield (Department of Microbiology and Biochemistry, University of the Orange Free State, South Africa) and Bryce Kendrick(8727 Lochside Drive, Sydney, B.C., Canada) are thanked for a crytical reading of the script.

REFERENCES

Arnold, T.H. & De Wet, B.C. (1993). Plants of Southern Africa: names and distribution. *Memoirs of the Botanical Survey of Southern Africa* **62**: 1-825.

Arx, J.A., von. (1983). *Mycosphaerella* and its anamorphs. *Proceedings of the Koninklijke Nederlandse Akademie van Wettenschappen, Ser. C: Biological and Medical Sciences* **86**, 15-54.

Bessey, E.A. (1953). Notes on the genus *Camptomers*, fungi imperfecti. *Mycologia* **54**, 364-390.

Braun, U. (1988a). Studies on *Ramularia* and allied genera (1). *International Journal of Mycolology and Lichenology* **3**: 271-285.

Braun, U. (1988b). Studies on *Ramularia* and allied genera (2). *Nova Hedwigia* **47**: 335-349.

Braun, U. (1989). *Cercospora*-like fungi on *Cassia*. *International Journal of Mycolology and Lichenology* **4**: 191-204.

Braun, U. (1990). Studies on *Ramularia* and allied genera (3). *Nova Hedwigia* **50**: 499-521.

Braun, U. (1991). Studies on *Ramularia* and allied genera (4). *Nova Hedwigia* **53**: 291-305.

Braun, U. (1993a). Studies on *Ramularia* and allied genera (6). *Nova Hedwigia* **56**: 423-454.

Braun, U. (1993b). Taxonomic notes on some species of the *Cercospora* complex (3). *Mycotaxon* **48**: 275-298.

Braun, U. (1994). New genera of phytopathogenic Deuteromycetes. *Cryptogamic Botany* **4**: 107-114.

Braun, U. & Feiler, U. (1995). *Cladophialophora* and its teleomorph. *Microbiological Research* (in press).

Braun, U. & Rogerson, C.T. (1993). Phytoparasitic hyphomycetes from Utah (USA). *Mycotaxon* **46**: 263-274.

Brown, L.G. & Morgan-Jones, G. (1976). Notes on hyphomycetes. 11. Additions to the genera *Cercosporidium*, *Passalora* and *Phaeoisariopsis*. *Mycotaxon* **4**: 299-306.

Castañeda, R.F. & Braun, U. (1989). *Cercospora* and allied genera of Cuba (I). *Cryptogamic Botany* **1**: 42-55.

Chupp, C. (1954). A monograph of the fungus genus *Cercospora*. Ithaca, New York. Published by the author.

Chupp, C. & Doidge, E.M. (1948). *Cercospora* species recorded from South Africa. *Bothalia* **4**: 881-893.

Crous, P.W. & Braun, U. (1994). *Cercospora* species and similar fungi occurring in South Africa. *Sydowia* **46**: 204-224.

Crous, P.W. & Braun, U. (1995). *Cercospora* species and similar fungi of South Africa. *Mycological Research* **99**: 31-36.

Crous, P.W., Wingfield, M.J., Marasas, W.F.O. & Sutton, B.C. (1989). *Pseudocercospora eucalyptorum* sp. nov. on *Eucalyptus* leaves. *Mycological Research* **93**: 394-498.

Darvas, J.M. & Kotzé, J.M. (1987). Fungi associated with pre- and postharvest diseases of avocado fruit at Westfalia Estate, South Africa. *Phytophylactica* **19**: 83-85.

Deighton, F.C. (1967). New names in *Mycosphaerella* (*M. arachidis* and *M. pruni-persicae*) and validation of *M. rosicola. Transactions of the British Mycological Society* **50**: 328-329.

Deighton, F.C. (1971). Studies on *Cercospora* and allied genera. 3. *Centrospora. Mycological Papers* **124**: 1-13.

Deighton, F.C. (1973). Studies on *Cercospora* and allied genera. 4. *Cercosporella* Sacc., *Pseudocercosporella* gen. nov.. and *Pseudocercosporidium* gen. nov. *Mycological Papers* **133**: 1-62.

Deighton, F.C. (1974). Studies on *Cercospora* and allied genera. 5. *Mycovellosiella* Rangel, and new species of *Ramulariopsis*. *Mycological Papers* **137**: 1-73.

Deighton, F.C. (1976). Studies on *Cercospora* and allied genera. 6. *Pseudocercospora* Speg., *Pantospora* Cif. and *Cercoseptoria* Petr. *Mycological Papers* **140**: 1-168.

Deighton, F.C. (1979). Studies on *Cercospora* and allied genera. 7. New species and dispositions. *Mycological Papers* **144**: 1-56.

Deighton, F.C. (1983). Studies on *Cercospora* and allied genera. 8. Further notes on *Cercoseptoria* and some new species and redispositions. *Mycological Papers* **151**: 1-13.

Deighton, F.C. (1987). New species of *Pseudocercospora* and *Mycovellosiella*, and new combinations into *Pseudocercospora* and *Mycovellosiella*. *Transactions of the British Mycological Society* **88**: 365-391.

Deighton, F.C. (1990). Observations on *Phaeoisariopsis*. *Mycological Research* **94**: 1096-1102.

Doidge, E.M. (1924). A preliminary check list of plant diseases occurring in South Africa. *Botanical Survey of South Africa, Memoir* **6**: 1-56.

Doidge, E.M., Bottomley, A.M., van der Plank, J.E. & Pauer, G.D. (1953). A revised list of plant diseases in South Africa. *Union of South Africa, Department of Agriculture, Science Bulletin* **346**: 1-122.

Doidge, E.M. (1950). The South African Fungi and Lichens to the end of 1945. *Bothalia* **5**: 1-1094.

Ellis, M.B. (1971). Dematiaceous hyphomycetes. International Mycological Institute, Surrey, England.

Ellis, M.B. (1976). More dematiaceous hyphomycetes. International Mycological Institute, Surrey, England.

Gevers, H.O., Lake, J.K. & Hohls, T. (1994). Diallel cross analysis of resistance to gray leaf spot in Maize. *Plant Disease* **78**: 379-383.

Gorter, G.J.M.A. (1977). Index of plant pathogens and the diseases they cause in cultivated plants in South Africa. Department of Agriculture Technical Services, Science Bulletin 392.

Gorter, G.J.M.A. (1982). Supplement to index of plant pathogens and the diseases they cause in cultivated plants in South Africa. Department of Agriculture Technical Services, Supplement to Science Bulletin 392.

Govindu, H.C. & Thirumalachar, M.J. (1954). Notes on some Indian Cercosporae. 4. *Sydowia* **8**: 221-230.

Guo, Y.-L. & Liu X.-J. (1992). Studies on the genus *Pseudocercospora* in China II. *Acta Mycol. Sinica* **11:** 125-133.

Hsieh, W.H. & Goh, T.K. (1990). *Cercospora* and similar fungi from Taiwan. Maw Chang Book Company, Taipei, Taiwan, Republic of China.

Kobayashi, T. (1984). Notes on fungi parasitic to woody plants in Paraguay. *Transactions of the Mycological Society of Japan* **25**: 255-273.

Lamprecht, S.C. & Knox-Davies, P.S. (1984). Preliminary survey of foliage diseases of annual *Medicago* spp. in South Africa. *Phytophylactica* **16**: 177-183.

Marasas, W.F.O., Van Wyk, P.S. & Knox-Davies, P.S. (1975). *Batcheloromyces*, a new genus of annellidic dematiaceous hyphomycetes on *Protea cynaroides* in South Africa. *South African Journal of Botany* **41**: 41-45.

Morris, M.J. (1989). Host specificity studies of a leaf spot fungus, *Phaeoramularia* sp., for the biological control of crofton weed (*Ageratina adenophora*) in South Africa. *Phytophylactica* **21**: 281-283.

Morris, M.J. & Crous, P.W. (1994). New and interesting records of South African fungi. 14. Cercosporoid fungi from weeds. *South African Journal of Botany* **60**:325-332.

Pollack, F.G. (1987). An annotated compilation of *Cercospora* names. *Mycological Memoir* **12**: 1-212.

Pons, N. & Sutton, B.C. (1988). *Cercospora* and similar fungi on yams (*Dioscorea* species). *Mycological Papers* **160**: 1-78.

Sutton, B.C. & Pascoe, I.G. (1989). Reassessment of *Peltosoma, Stigmina* and *Batcheloromyces* and description of *Hyphothyrium* gen. nov. *Mycological Research* **92**: 210-222.

Viégas, A.P. (1945). Alguns fungos do Brasil - Cercosporae. *Boletim da Sociedade Brasileira de Agronomia* **8**: 1-160.

Wager, V.A. (1972). Records of diseases of ornamental plants not previously reported in South Africa. *Republic of South Africa, Department of Agriculture, Technical Services, Technical Communication* **100**: 1-14.

Walker, J., Sutton, B.C. & Pascoe, I.G. (1992). *Phaeoseptoria eucalypti* and similar fungi on *Eucalyptus*, with description of *Kirramyces* gen. nov. (Coelomycetes). *Mycological Research* **96**: 911-924.

MYCOTAXON

Volume LVII, pp. 323-328 January-March 1996

CONTRIBUTION TO THE KNOWLEDGE OF WOOD-ROTTING FUNGI IN BRAZIL. II. CHECKLIST OF FUNGI FROM MARACÁ ISLAND, RORAIMA STATE.

MARIA APARECIDA DE JESUS
Instituto Nacional de Pesquisas da Amazônia
CPPF/INPA. Cx.Postal 478, 69011-970, Manaus, Brazil.

ABSTRACT

A checklist of 64 wood-rotting fungi species from the Maracá Island is provided as well as the distribution of the fungi in each substrat. Most of these species are cited for the first time for the Roraima State and Kavinia alboviridis (Morgan.) Gilbn. & Bulding., Leucogyrophana romellii Ginns, L. subillaqueata (Kitsch.) Jül., Scytinostroma cfr. duriusculum (Berk. & Br.) Donk, S. odoratum (Fr.) Donk, S. hemidichophyticum Pouzar, S. rhizomorpharum Rattan and Vuilleminia comedens (Nees: Fr.) Maire are new records for South America.

INTRODUCTION

This study was undertaken to identify a collection of wood-rotting fungi deposited in the Wood Pathology Laboratory of CPPF/INPA. The collection was made during a general ecological survey in Maracá Ecological Station sponsored by National Institute for Amazonian Research (INPA/Roraima). A checklist of 64 species is presented.

MATERIAL METHODS

The study area is located in the Maracá Ecological Station (3° 30' N and 61° 30' W). The local climate is of the seasonal tropical type, with monthly temperatures in the range of 26-29° C. Annual rainfall is approximately 1900-2000 mm, mostly between April and August (EDEN et alii, 1991).

All collections were made in the period of 19-22 July, 1989. Genera and species are listed alphabetically within each family. After the name the following abbreviations are used to designate reference specimens: LPM= Wood Pathology Laboratory, M= Maracá Island and host information: A= Living tree, B= Naturally fallen tree, C= Fallen branch, D= Building wood, E= Sawmill wood and S= palm tree. Those species preceded by an (*) have not been previously recorded in Brazil. All specimens are deposited in the Herbarium of Instituto Nacional de Pesquisas da Amazônia/INPA, Manaus. References used include CUNNINGHAM (1963); ERIKSSON & RYVARDEN (1973, 1975, 1976); ERIKSSON; HJORTSTAM and RYVARDEN (1978, 1981) ; GILBERTSON & RYVARDEN (1987) and HALLENBERG & ERIKSSON (1985).

RECORDS AND DISCUSSION

Checklist of wood-rotting fungi species from Maracá Island with host data

TRICHOLOMATACEAE
Favolus sp
(LPM0921MB, LPM0978MB)
Panus badius (Berk.) Sing.
(LPM0896MB)
Panus rudis Fr.
(LPM0949MB)
CORTICIACEAE
Acanthophysium sp
(LPM960MB)
Aleurodiscus aurantium (Fr.) Schroet.
(LPM0975MC)
Aleurodiscus sp
(LPM0911MB)
Botryobasidium obtusisporum Erikss. *
(LPM0877MB)
Ceraceomerulius rubicundus (Litsch.in Pilat.)Erikss.*
(LPM0915MC)
Cystidiodontia artocreas (Berk & Curt.ex Cke.) Hjortst.
(LPM0903MB, LPM0970MB, LPM0893MB)
Fibricium rude (Karst.) Jül.
(LPM0981MC)
Fibrodontia gossypina Parm.
(LPM0948MB)
Fibulomyces mutabilis (Bres.) Jül.
(LPM0891)
Gloeocystidiellum convolvens (Karst.) Donk *
(LPM0982MC)
Hyphochnicium lundellii (Bourd.) Erikss.
(LPM0883MS)

Hyphodontia sp
(LPM0897MB, LPM0958MB, LPM0961MB, LPM0977MC)
Leucogyrophana romellii Ginns
(LPM0927MB)
Leucogyrophana subillaqueata (Litsch.) Jül.
(LPM0870MB, LPM0938MB, LPM0912MB)
Kavinia alboviridis (Morgan.) Gilbn. & Bulding. *
(LPM0914MB)
Peniophora sp
(LPM0910MB)
Phanerochaete sordida (Karst.) Erikss & Ryv.
(LPM0928MB, LPM0929MB)
Phlebia sp
(LPM0935MB)
Stereum fasciatus Schw.
(LPM088MB)
Vuilleminia comedens (Nees: Fr.) Maire
(LPM0917MS)
GANODERMATACEAE
Amauroderma sp
(LPM0913MB)
Ganoderma lucidum (W. Curt.:Fr.) Karst.
(LPM0881MA, LPM0882MA)
Ganoderma sp
(LPM0878MB)
Humphreya sp
(LPM0913MB)
HYMENOCHAETACEAE
Hymenochaete caco (Berk.) Berk.
(LPM0872MB, LPM0908MB)
Hymenochaete sp
(LPM0874MB)
Phellinus gilvus (Schw.) Pat.
(LPM0943MB)
Phellinus noxius (Corner) Cunn.
(LPM0902MS, LPM0924MB, LPM0953MB)
LACHNOCLADIACEAE
Asterostroma cervicolor (Berk. & Curt.) Mass.
(LPM0931MB)

---

* New register for Brazil
SUBSTRATE TYPES: A= Living Tree, B= Naturally Fallen Tree, C= Fallen Branch, D= Building Wood,E= Sawmil Wood, S= Palm Tree

Asterostroma musicolum (Berk. & Curt.) Mass. *
(LPM0930MB)
Scytinostroma cfr. duriusculum (Berk. & Br.) Donk
LPM0889MB)
Scytinostroma hemidichophyticum Pouzar
(LPM0932MB)
Scytinostroma odoratum (Fr.) Donk
(LPM0888MB, LPM0918MB, LPM0951MS)
Scytinostroma rhizomorpharum Rattan *
(LPM0890MC, LPM0892MC, LPM0895MB, LPM0898MB, LPM916MB, LPM0937MC, LPM0966MC, LPM0973MC)
Vararia sp
(LPM0974MB)
PODOCYPHACEAE
Cymatoderma caperatus (Mont. & Berk.) Reid
(LPM0922MB)
Cymatoderma dentriticum (Pers.) Reid
(LPM0955MB)
POLYPORACEAE
Antrodiella cfr. overholtsii Ryv. & Gilbn.
(LPM0884MB, LPM0939MB)
Antrodiella spp
(LPM0904MB, LPM0942MB, LPM0952MB)
Coriolopsis rigida (Berk. & Mont.) Murr.
(PM0880MB)
Earliella scabrosa (Pers.) Gilbn. & Ryv.
(LPM0907MB, LPM0936MB)
Fomes fasciatus (Sw. & Fr.) Cke.
(LPM0925MB)
Grammothele fuligo (Berk. & Br.) Ryv.
(LPM0968MS)
Grammothele lineata Berk. & Curt.
(LPM0923MB)
Grammothele subargentea (Speg.) Rajch.
(LPM0919MC)
Grammothele sp
(LPM0879MC,LPM0964MB)
Hexagona papyracea Berk.
(LPM0947MB, LPM0933MB, LPM0905MB)
Packykytospora alabamae (Berk. & Cke.) Ryv.
(LPM0894MC)

Perenniporia glaucopora Lloyd. Ryv.
(LPM0940MB)
Perenniporia sp
(LPM0878MB)
Polyporus infernalis Berk.
(LPM0965MB)
Rigidoporus microporus (Fr.) Overeem
(LPM0875MB, LPM0876MB, LPM0900MB, LPM0957MB)
Trametes modesta (Fr.) Ryv.
(LPM0873MB, LPM0885MB, LPM0886MB, LPM0944MB)
Trametes villosa (Fr.) Kreisel
(LPM0920MB)
Trametes sp
(LPM0871MB, LPM0976MB)
Trichaptum byssogenum (Jungh.) Ryv.
(LPM0899MB)
Trichaptum sp
(LPM0956MB)
AURICULARIACEAE
Auricularia polytricha (Mont.) Sacc.
(LPM0967MB)
GASTEROMYCETES
Geastrum triplex Jungh.
(LPM0909MB)
ASCOMYCOTINA
Cookeina sulcipes (Berk.) Kuntze
(LPM0979MS)
Xylaria cfr. dealbata Berk. & Curt.
(LPM0971MB)

A total of 104 specimens of wood-rotting fungi representing 51 genera and 64 especies were identified. Most species were collected on naturally fallen trees and branches. Only Ganoderma lucidum (W. Curt.: Fr.) Karst. was collected on living tree. The well known tree-parasites, Grammothele fuligo (Berk. & Br.) Ryv. and Grammothele sp were found on living palms tree and Cystidiondontia artocreas (Berk & Curt. ex. Cke.) Hjortst, Hypochnicium lundellii (Bourd.) Erikss. Scytinostroma odoratum and Vuilleminia comedens were commonly found on dead adherent dying peteoles of palms tree.

Most of the genera taken on Maracá Island have not been previously recorded or collected in Roraima State, and Kavinia alboviridis, Leucogyrophana romellii, L. subillaqueata, Scytinostroma cfr. duriusculum, S. odoratum, S.

rhizomorpharum S. hemidichophyticum, and Vuilleminia comedens have not previously been recorded in South America.

The checklist shows a great diversity of wood-rotting fungi in Maracá Island and many species such as: Aleurodiscus aurantium (Fr.) Schroet., Botryobasidium obtusisporum Erikss., Ceraceomerulius rubincundus (Litsch. in Pilat.) Erikss. Fibulomyces mutabilis (Bres.) Jül., L. subillaqueata and S. hemidichophyticum that are reported from Europe, North America and India by ERIKSSON & RYVARDEN (1973, 1975, 1976) and RATTAN (1974). Unquestionably, future collecting in Maracá Island will increase the knowledge about the distribution of wood-rotting fungi and the new species in the Neotropical Region.

ACKNOWLEDGEMENTS

The author is grateful to Dr. Leif Ryvarden, from the University of Oslo, for access to ours collection and review of the manuscript. A further thanks to Celso Morato de Carvalho for the opportunity to collect at Maracá Island. Thanks also goes to the International Tropical Timber Organization (ITTO) and to the National Council for Scientific and Technological Development (CNPq) for financial support.

REFERENCES

CUNNINGHAM, G.H. 1963, The Thelephoraceae of Australia and New Zealand. Dep. Scie. and Id. Res. Wellington. 359p.

EDEN, M.J. & McGREGOR, D.F. VIEIRA, N.A. 1991. Soil Physical and Chemical properties of Cultivated Pasture on Forest Land, Roraima, Acta Amazônica. 21:375-390.

ERIKSSON, J. & RYVARDEN, L. 1973. The Corticiaceae of North Europe. Fungiflora, Oslo. 2: 60-261.

ERIKSSON, J. & RYVARDEN, L. 1975. The Corticiaceae of North Europe. Fungiflora, Oslo. 3: 289-546.

ERIKSSON, J. & RYVARDEN, L. 1976. The Corticiaceae of North Europe. Fungiflora, Oslo. 4: 549-886.

ERIKSSON, J.; HJORTSTAM, K.; RYVARDEN, L. 1978. The Corticiaceae of North Europe. Fungiflora, Oslo. 5: 889-1049.

ERIKSSON, J.; HJORTSTAM, K. ; RYVARDEN, L. 1981. The Corticiaceae of North Europe. Fungiflora. Oslo. 6: 1051-1276.

GILBERTSON, R.L. & RYVARDEN, L. 1987. The North American Polypores. Fungiflora, Oslo. 2: 434-885.

HALLENBERG, N. & ERIKSSON, J. 1985. The Lachnocladiaceae and Coniophoraceae of North Europe. Fungiflora, Oslo. 96p.

HJORTSTAM, K.; LARSON, K.; RYVARDEN, L. 1988. The Corticiaceae of North Europe. Fungiflora, Oslo. 8: 1450-1631.

RATTAN, S. S.1974. Scytinostroma in India with Notes on Extralimital Species. British Mycol. Society 63(1): 1-12.

RYVARDEN, L. & JOHANSEN, I. 1980. A Preliminary Polypore Flora of East Africa. Fungiflora, Oslo. 636p.

MYCOTAXON

Volume LVII, pp. 329-345 January-March 1996

TRUFFLE-LIKE FUNGI FROM SOUTH AMERICA: *HYSTERANGIUM* SENSU LATO

MICHAEL A. CASTELLANO

United States Department of Agriculture, Forest Service, Pacific Northwest
Research Station, Forestry Sciences Laboratory, 3200 Jefferson Way,
Corvallis, Oregon 97331

and

J. J. MUCHOVEJ *

Departamento de Fitopatologia, Universidade Federal de Viçosa, Viçosa,
MG, Brazil 36570

ABSTRACT

Re-examination of collections previously identified as species of *Hysterangium* from South America revealed a number of taxa in several distinct genera. To facilitate a modern survey of the truffle-like, presumptive ectomycorrhizal flora of South America, we redescribe nearly all South American taxa previously placed in the genus *Hysterangium*, describe several new *Hysterangium* species. The new genus, *Hallingea* is described to accommodate three *Hysterangium* species.

INTRODUCTION

Seventy species of truffle-like Basidiomyete fungi have been described from South America (Castellano and Trappe, 1990; 1992). Most are in genera presumed to be ectomycorrhizal (i.e., *Gautieria*, *Hysterangium*, *Rhizopogon*, and *Thaxterogaster*). Of these, 41 were originally described from Argentina, 21 from Chile, 5 from Brazil, and 3 from Ecuador. Many South American specimens were incorrectly identified as species endemic to Europe or North

* Current address - P.O. Box 25, Lloyd, Florida, USA, 32337

America. The vascular plant flora of South America differs vastly in composition from that of the Northern Hemisphere. In our experience, the mycorrhizal flora associated with Southern Hemisphere plant hosts similarly differs from that associated with the plant hosts from the Northern Hemisphere. This paper is the first in a series intended to modernize the taxonomic treatment of truffle-like fungi associated with South American plant hosts. We begin with an evaluation of taxa previously assigned to the genus *Hysterangium*. In addition, four new *Hysterangium* species are described.

Methods of collection and macroscopic and microscopic procedures were generally those of Smith (Smith and Zeller, 1966). Herbarium names are abbreviated according to Holmgren and Keuken (1974). Colors of fresh specimens are in general terms of the authors. Hand-cut sections of dried material were mounted in 5% KOH or Melzer's reagent for standard light microscopy. Spore dimensions are based on the measurement of at least 25 randomly selected spores; spore lengths include sterigmal attachment when present. Measurements of sterile tissues (e.g., peridium) and spores are from mature sporocarps. Light photomicrographs are from material mounted in 5% KOH.

TAXONOMY

Key to *Hysterangium* species

1. Spores 9-12 µm long; utricle (perispore) distinctly inflated up to 2.5 µm on a side, attached below apex and above base to form a complete or partial cylinder around spore..***H. inflatum***
1. Spores mostly 12-15 µm long, utricle not inflated as above......................**2**
    2. Peridium a single layer of polyhedral cells 30-40 x 50-75 µm...***H. crassipariete***
    2. Peridium with at least two layers, at least one layer of interwoven hyphae...**3**
3. Spores smooth beneath utricle; peridial epicutis 125-180 µm thick, of hyaline to pale brown hyphae, 5-6 µm in diam and sometimes inflated up to 13 µm in diam..***H. incognitum***
3. Spores minutely verrucose beneath utricle..**4**
    4. Gleba olive brown; spore wall less than 0.5 µm thick; peridium entirely of pale brown to dark reddish brown tissue....***H. spegazzinii***
    4. Gleba olive green, spore wall ±1 µm thick; peridium with mesocutis and subcutis of hyaline tissue...***H. hallingii***

HYSTERANGIUM CRASSIPARIETE Castellano & Muchovej, *sp. nov.*

Basidiomata subglobosa, lobata vel irregularia, alba, rosea contundentia, glabra. Gleba juventute pallide viridia, maturitate pallide grisea; loculi ex centro radiantes, elongates et vacues. Rhizomorphae singulares vel numerosae, crassae, albae. Columella gelatinosa, dendroidea, crassa. Peridium facile separabile, strato singulari 100-250 *µm crasso, cellulis hyalinis polyhedralibus; fibulae absentes. Trama* 70-150 *µm crassa, hyphis hyalinis, compactis,* 3-5 (-7) *µm in diam, fibulae absentes. Sporae singulares in* KOH *hyalinae vel pallide virides, aggregatae pallide virides vel virides, laeves,* (11-) 12-115 x 4-5 *µm; apex acutus vel obtusus; paries* 1 *µm crassus; utriculus distinctus, rugosus, irregulariter inflatus usque ad* 1 (-2) *µm. Holotypus: leg* Singer 317 (BAFC 30372).

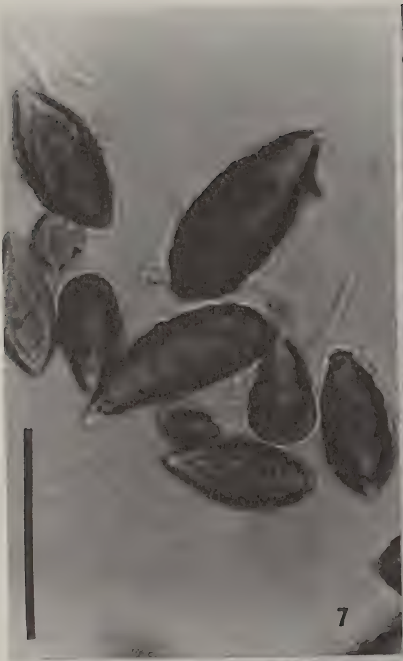
Basidiomata 0.5–2 cm in diam, subglobose, lobed or irregular, slightly indented at base, white when fresh, bruising rose, mottled pale brown to pale pinkish brown and white when dry, surface glabrous above. **Gleba** pale green at first, later pale gray, olive to dark greenish black when dried; locules radiating from a central point, elongate, empty. **Rhizomorphs** single or numerous, stout, attached at base, white at first, concolorous with peridium when dry. **Columella** gelatinous, distinct, dendroid, stout, arising from a sterile base.

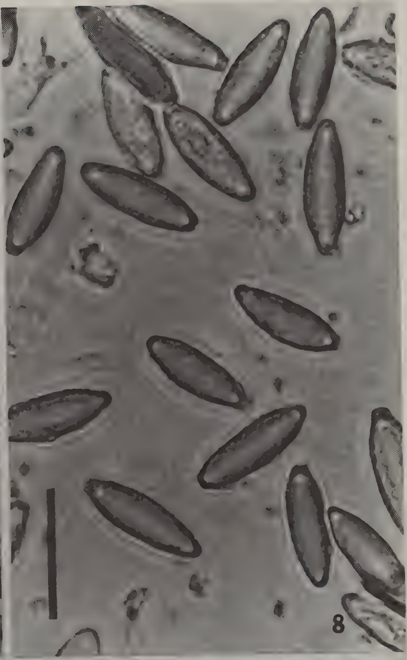
Peridium easily separable from gleba, a single layer 100–250 µm thick, of hyaline polyhedral cells, 30–40 x 50–75 µm, that are much smaller at interface of peridium and gleba and near the outer surface, minute crystals adhering to the outer cells, clamp connections absent; a superficial layer of pale brown, elongate hyphae emanating from the surface.

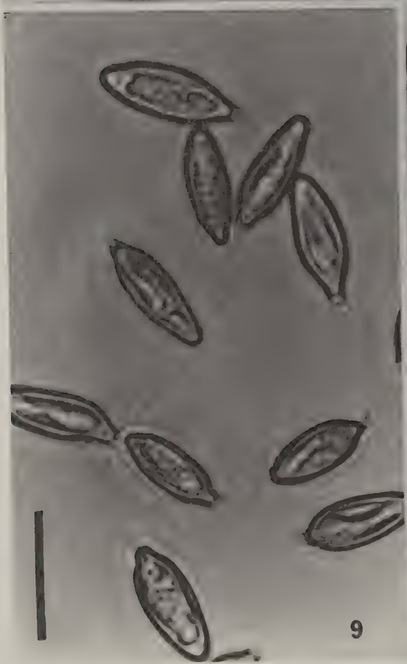
Trama 70–150 µm thick, of hyaline, compact, more or less parallel to interwoven hyphae, 3–5 (–7) µm in diam, in a gelatinized matrix, clamp connections absent. **Basidia** not seen.

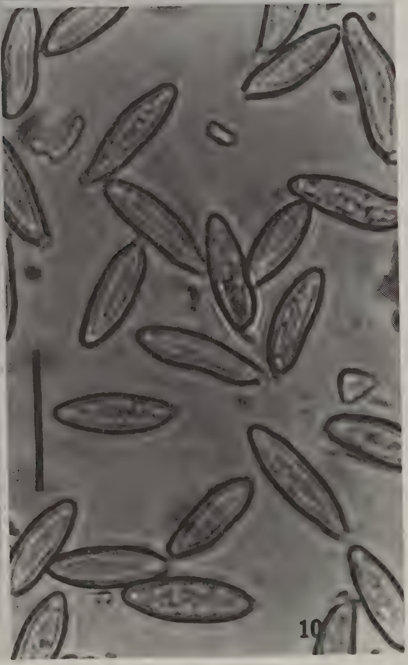
Spores smooth, (11–) 12–15 x 4–5 µm, ellipsoid to oblong; apex acute to blunt, base usually with a slight sterigmal appendage (Fig. 1). **Spore wall** ±1 µm thick. **Utricle** distinct, wrinkled, irregularly inflated to 1 (-2) µm. **Spore color** in KOH hyaline to pale green singly, pale green to green in mass.

Figs. 1-6. Basidiospores of *Hysterangium* species. **1.** *H. crassipariete* Halling 5950, bar = 12 µm. **2.** *H. hallingii*, Halling 5741, bar = 12 µm. **3.** *H. incognitum*, BAFC 23997, bar = 12 µm. **4.** *H. incognitum* using Nomarski optics, BAFC 23997, bar = 12 µm. **5.** *H. inflatum*, Mille 3, bar = 10 µm. **6.** *H. spegazzinii*, BAFC 30372, bar = 12 µm.


7


8


9


10

ETYMOLOGY: Latin, "*crassi-*", and "*pariete*" referring to the thick spore wall.

HABIT, HABITAT AND SEASON: Hypogeous; probable mycorrhizal associate *Nothofagus dombeyi*; April.

COLLECTIONS EXAMINED: **ARGENTINA**: Neuquen Province, Las Lajas, leg R. Halling 5950, 2 April 1988 (Holotype NY, isotype OSC).

DISCUSSION: This species is associated with *Nothofagus* spp. in Argentina. *Hysterangium crassipariete* is near *H. affine* Massee & Rodway in Massee but *H. affine* lacks the superficial layer of hyphae, has thin-walled spores and occurs with Myrtaceae.

HYSTERANGIUM HALLINGII Castellano & Muchovej, *sp. nov.*

Basidiomata subglobosa vel asymmetrica, initio alba, ubi contusa rosea vel rufa, in sicco brunneola et alba maculata, foveolata, subtomentosa, usque ad 2.5 *µm crassa. Gleba olivacea, loculis elongatis et vacuis. Rhizomorphae numerosae, volidae, basales, peridio concolores. Columella gelatinosa vel cartilaginea, dendroidea, e basi sterili exoriens. Peridium triplex, non separabile; epicutis usque ad* 75 *µm crassa, hyphis avellaneis, evanidis, fibulatis, laxe intertexis; mesocutis parenchymata, usque ad* 300 *µm crassa, hyphis hyalinis, inflatis,* 20-30 *µm, fibulae nullae; subcutis usque ad* 50 *µm crassa, hyalinis, intertexa, fibula nulla. Trama usque ad* 125 *µm crassa, hyphis hyalinis, intertexis vel subparallelis in matrice gelatinosa, fibulae nullae. Sporae minute verruculosae,* 12–14 x 4.5–5.5 *µm, ellipsoideae, apice obtuso, base breviter pedicellata; utriculus distinctus, rugosus, inflatus usque ad* 1 *µm; in* KOH; *singulatim pallide viridae, aggregatea pallide olivacae. Holotypus: leg* Halling 5741 (NY).

Basidiomata up to 2.5 cm in diam, subglobose to slightly irregular, white at first, bruising rose to reddish brown, mottled pale brown and white when dry, surface slightly pitted and subtomentose. **Gleba** olive green; locules elongate, empty. **Rhizomorphs** numerous, somewhat stout, attached at base, concolorous with peridium. **Columella** gelatinous to cartilaginous, distinct, dendroid, arising from a sterile base.

Peridium not separable from gleba, 400-450 µm thick, three layered: epicutis up to 75 µm thick, somewhat evanescent, of yellow brown, thick-walled (0.5 µm), loosely interwoven hyphae, 4-5 µm diam; constricted at septa, clamp connections common, encrusted with minute crystals; mesocutis up to 300 µm thick, of thin-walled, hyaline, inflated parenchyma-like cells, 20-30 µm in diam, clamp connections absent; subcutis up to 50 µm thick, of thin-walled, hyaline, interwoven, occasionally clavate hyphae up to 5 µm diam, clamp connections absent.

Trama up to 125 µm thick, of hyaline, thin-walled, interwoven to subparallel hyphae, 4-5 µm in diam, in a gelatinized matrix, clamp connections absent. **Basidia** hyaline, thin-walled, clavate, 7-8 x 20+, 4 spored.

Spores minutely verrucose, 12–14 x 4.5–5.5 µm, ellipsoid; apex acute, base truncate-cupped, ±2 µm broad (Fig. 2). **Spore wall** ±1 µm thick, slightly thicker at apex. **Utricle** distinct, wrinkled, irregularly inflated to 1 µm. **Spore color** in KOH pale green singly, pale olive in mass.

ETYMOLOGY: Latin, *"hallingii,"* named in honor of Dr. Roy Halling of the New York Botanical Garden, collector of the holotype.

HABIT, HABITAT AND SEASON: Hypogeous; probable mycorrhizal associates *Nothofagus betuloides* and *N. pumilio*; February and March.

COLLECTIONS EXAMINED: **ARGENTINA**: Tierra del Fuego, Tierra del Fuego National Park, ±17 km east of Ushuaia, leg R. Halling 5741, 24 February 1988 (holotype NY, isotype OSC). PARATYPES: **CHILE**: Magallanes, Torres del Paine National Park, trail from Lago Grey to Lago Pingo, leg R. Halling 5820, 9 March 1988 (NY, OSC). Magallanes, Punta Arenas, leg R. Thaxter, February 1906 (wet material in FH, OSC).

DISCUSSION: The three-layered peridium is rare in the genus and is shared only by the Northern Hemisphere species, *H. epiroticum* Pacioni from Hungary. *Hysterangium epiroticum* has much larger spores than *H. hallingii*.

HYSTERANGIUM INCOGNITUM Castellano & Muchovej, sp. nov.

Basidiomata subglobosa vel asymmetrica, in sicco alba et pallide brunnea vel pallide rufa maculata, tomentosa. Gleba viridi-flava vel viridi-brunnea, loculis elongatis et vacuis. Columella in sicco inconspicua, dendroidea. Peridium duplex, non separabile; epicutis 125-180 *µm crassa, hyphis hyalinis intertexis; subcutis* 150-250 *µm crassa, parenchymatis, hyphis hyalinis, inflatis* 20-30 *µm, fibulae nullae. Trama usque ad* 60 *µm crassa, hyphis hyalinis, intertextis in matrice gelatinosa, fibulae nullae. Sporae laevae,* 12–13.5 x 5–6 *µm, ellipsoidae, apice obtusis, base truncatae, utriculus distinctus, rugosus, em apice e basis affixus; in KOH; singulatim pallide viridae, aggregatae pallide olivo-fuscae. Holotypus: leg* Singer 5081 (BAFC 23997).

Basidiomata up to 2.0 cm in diam, subglobose to slightly irregular, mottled white and pale brown to pale reddish brown when dry, surface tomentose. **Gleba** greenish yellow to greenish brown; locules elongate, empty. **Rhizomorphs** not seen. **Columella** somewhat inconspicuous when dried, dendroid.

Peridium not separable from gleba, two layered: epicutis 125-180 µm thick, of hyaline to pale brown, thin-walled, interwoven hyphae 5-6 µm in diam, sometimes inflated up to 13 µm in diam, encrusted with minute crystals, clamp connections absent; subcutis 150-250 µm thick, of thin-walled, hyaline to pale brown, inflated parenchyma-like cells 20-30 µm in diam, clamp connections absent.

Trama up to 60 µm thick, of hyaline, thin-walled, interwoven hyphae, 2-3 µm in diam, in a gelatinized matrix, clamp connections absent. **Basidia** not seen.

Spores smooth, 12–13.5 x 5–6 µm, ellipsoid to slightly irregular; apex blunt, base truncate (Figs. 3 &4). **Spore wall** ± 0.5 µm thick, sometimes thicker at apex. **Utricle** distinct, wrinkled, occasionally slightly inflated at apex and base. **Spore color** in KOH pale green singly, pale olive brown in mass.

ETYMOLOGY: Latin, *"incognitum,"* in reference to the relative obscurity of this collection.

HABIT, HABITAT AND SEASON: Hypogeous; probable mycorrhizal associates *Nothofagus dombeyii* and *N. saxegothaeana*; April and May.

COLLECTIONS EXAMINED: **ARGENTINA**: Neuquén, L. Correntoso, leg M. Singer 5081, 20 April 1965 (holotype BAFC 23997, isotype OSC). PARATYPE: **ARGENTINA**: Rio Negro, Laguna Frías, leg M. Singer 3850 (identified as *H. separabile*), 2 May 1964 (BAFC 30371, OSC).

DISCUSSION: The combination of a relatively thick hyphal subcutis and the distinctly wrinkled utricle of the wide spores distinguish this species from all other *Hysterangium* species.

HYSTERANGIUM INFLATUM Rodway, Paps. & Proc. Roy. Soc. Tasmania **1917**: 108. 1918.

= *Hysterangium eucalyptorum* Lloyd, Mycol. Notes **65**: 1031. 1921.
= *Hysterangium pterosporum* Donadini & Riousset, Trav. Sci. Parc Nation. Port–Cros **5**: 12. 1979.

Basidiomata 0.5 –2 cm in diam, subglobose, ellipsoid to irregularly lobed, white when fresh, readily handling pale brown to pale reddish brown, drying dark brown except in protected areas which are pale brown to almost white, surface smooth to felty when fresh, wrinkled slightly, tomentose when dry, with some soil particles adhering to surface when dry. **Gleba** bright greyish green to bright green when young, dark olive to almost black when mature; locules elongate, partially to completely filled with spores. **Rhizomorphs** numerous small, attached at base, concolorus with peridium. **Columella** gelatinous, dendroid, narrow, dark grey.

Peridium not easily separable from gleba, a single layer 140–150 (–250) µm thick, of brown (near surface), hyaline (near gleba), thin–walled, irregularly shaped, sometimes inflated hyphae, the cells elongate to subglobose, up to 5 µm in diam near gleba, usually up to 12 x 25 µm in mediostratum, numerous minute crystals adhering to outer hyphae, clamp connections common.

Trama 40–100 µm thick, of hyaline, loosely to compactly interwoven hyphae, 2.5–5 µm in diam, in a gelatinized matrix, hyphae mostly elongate, sometimes with nodose ends, clamp connections absent. **Basidia** rehydrating poorly, thin-walled, hyaline, (4) 6 spored.

Spores smooth, 9–12 x 4–5 µm without utricle, 9–12 x 8–9 with utricle, ellipsoid; apex obtuse, base sessile, sometimes truncate (Fig. 5). **Spore wall** less than 0.5 µm thick. **Utricle** distinct, inflated up to 2.5 µm on a side, attached at base and apex, commonly forming a cylinder around the spore. **Spore color** in KOH hyaline singly, pale green in mass.

ETYMOLOGY: Latin, referring to the greatly "inflated" utricle which is attached above the base and below the spore apex.

HABIT AND HABITAT: Hypogeous; probable mycorrhizal associates of *Eucalyptus* spp.

COLLECTIONS EXAMINED: **AUSTRALIA**: Tasmania, Mt. Wellington, FEB–1904, leg L. Rodway 1267 (holotype HO 89531, isotypes OSC, NY, FH). OTHER COLLECTIONS: **ECUADOR**: Quito, (Type of *H. eucalyptorum* Lloyd) leg Mille 3 (NY, PDD 8309). **FRANCE**: Porquelles, (det. by Riousset as *H. pterosporum*) leg Riousset (OSC).

DISCUSSION: The invalidly published taxon, *Hysterangium tunicatum* Cunningham was recently redescribed (Castellano & Beever 1994) and is clearly distinct from *H. inflatum* Rodway. Type material of *H. pterosporum* was not available to us but non-type material of *H. pterosporum* from Riousset proved to be conspecific with *H. inflatum.*

Hysterangium inflatum is easily distinguished from all other species by its unique, regularly inflated (barrel-like) utricle, which gives the spore a winged appearance.

Hysterangium inflatum appears to be a common ectomycorrhizal associate of *Eucalyptus* spp. and probably has been introduced with *Eucalyptus* seedlings, especially *E. globulus*, in many parts of the world.

HYSTERANGIUM SPEGAZZINII Castellano & Muchovej, *sp. nov.*

Basidiomata subglobosa vel leviter assymetrica, in sicco pallide avellanea et alba maculata, tomentosa, usque ad 1.2 *cm crassa. Gleba* *pallide olivacea vel olivaceobrunnea, loculis elongatis et vacuis. Rhizomorphae numerosae validae, basales, peridio concolores. Columella tenua, dendroidea, in sicco obscure olicaea vel rufa, e basi sterilis exoriens. Peridium cum strato superficiali hyphis laxe intertextis, aureobrunneis, particulis crystallinis incrustatis, fibulatis, duplex; epicutis a subcute facile recedens, usque ad* 250 *µm crassa, parenchymata, obscure avellanea vel obscure rufa, fibulae nullae; subcutis usque ad* 30 *µm crassa, hyphis hyalinis,* "periclinal", *fibulae nullae. Trama usque ad* 50 *µm crassa, hyalina, subparallela vel parallela, in matrice gelatinosa, fibulae nullae. Sporae minute verruculosae,* 12-14 x (4.5) 5-6 *µm, ellipsoideae, apice obtusa, base truncata; utriculus distinctus, rugosus, inflatus usque ad* 1 *µm; in KOH; singulatim pallide cinereo-virides, aggregatae pallide rufae. Holotypus: leg* Singer 317 (BAFC 30372).

Basidiomata up to 1.2 cm in diam, subglobose to slightly irregular, mottled pale yellow brown and white when dry, surface tomentose. **Gleba** pale olive to olive brown; locules elongate, empty. **Rhizomorphs** numerous, somewhat stout, attached at base, concolorous with peridium. **Columella** fine, dendroid, dark olive to reddish brown as dried, arising from a sterile base.

Peridium with a superficial layer of thin-walled, golden brown, loosely interwoven hyphae up to 5 µm diam, encrusted with crystalline particles, clamp connections common otherwise two-layered, epicutiis separable from subcutis; epicutis up to 250 µm thick, of thin-walled, dark yellowish brown to dark reddish brown, inflated clavate cells 20-30 µm diam, clamp connections absent; subcutis up to 30 µm thick, of thin-walled, hyaline to pale brown, periclinal hyphae up to 25 µm diam, much less inflated near gleba, clamp connections absent.

Trama up to 50 µm thick, of hyaline, mostly collapsed, thin-walled, subparallel to parallel hyphae, 2-5 µm in diam, in a gelatinized matrix, clamp connections absent. **Basidia** not seen.

Spores minutely verrucose, 12–14 x (4.5-) 5–6 µm, ellipsoid; apex acute, base truncate (Fig. 6). **Spore wall** less than 0.5 µm thick. **Utricle** distinct, wrinkled, irregularly inflated to 1 µm, commonly slightly inflated near apex. **Spore color** in KOH pale greyish green singly, pale reddish brown in mass.

ETYMOLOGY: Latin, "*spegazzinii,*" named in honor of Italian mycologist C. Spegazzini, who surveyed much of the South American mycoflora in the late 19th and early 20th centuries.

HABIT, HABITAT AND SEASON: Hypogeous; probable mycorrhizal associates *Eucalyptus* sp. or *Nothofagus dombeyi*; April and May.

COLLECTIONS EXAMINED: **ARGENTINA**: Buenos Aires, Laguna de los

Padres, leg Singer 317, (holotype BAFC 30372, isotype OSC). PARATYPES: **ARGENTINA**: Neuquén, Puerto Manzano, leg Singer 3426, 22 April 1964 (BAFC 23996, OSC). **URUGUAY**: Montevideo, leg C. Spegazinni, May 1914 (LPS 13339, OSC). Montevideo, leg C. Spegazinni, May 1914 (LPS 13342, OSC).

DISCUSSION: *Hysterangium spegazzinii* is near *H. hallingi* but *H. spegazzinii* has a two-layered perdium in contrast to the three-layered peridium of *H. hallingi.*

Excluded taxa

GELOPELLIS THAXTERI (Zeller & Dodge) Zeller, Mycologia **31**: 22. 1939.

≡ *Hysterangium thaxteri* Zeller & Dodge, Ann. Mo. Bot. Gard. **16**: 114–115, 1929.

We can add little to the description (as *Hysterangium thaxteri*) of Zeller and Dodge (**1929**). The small spores (3–4 x 1.5–2 µm) and thick (> 1.5 mm), uninterrupted, highly gelatinized peridium exclude this species from *Hysterangium*. Study of a portion of the type confirms its correct placement in the genus *Gelopellis*.

COLLECTIONS EXAMINED: **ARGENTINA**: Buenos Aries, leg R. Thaxter (isotype NY).

DISCUSSION: Another collection from Brazil (Rio Grande do Sul, Pareci Novo on Rio Cahi, leg J. Rick 145) labeled as this species in the Farlow herbarium is parasitized beyond identification.

HYMENOGASTER AUSTRALIS (Spegazzini) Spegazzini, Rev. Chilena Hist. Natur. **21**: 171. 1917.

≡ *Hysterangium australe* Spegazzini, *Fungi Argentini* **4**: 237. 1884.

≡ *Hymenogaster australis* (Spegazzini) Horak, *Sydowia* **17**: 202–203. 1963. comb. illeg.

Basidiomata up to 2 cm in diam, subglobose, mottled white and reddish brown when dried, surface slightly tomentose when dry. **Gleba** reddish brown; locules elongate, filled with spores. **Rhizomorphs** not seen. **Columella** absent.

Peridium not easily separable from gleba, a single layer less than 100 µm thick, of brown thin–walled, interwoven hyphae up to 5 µm diam, clamp connections common; colonized by a hyphomycete.

Trama 60–100 µm thick, of hyaline, subgelatinized, loosely interwoven hyphae, 2.5–5 µm in diam, clamp connections absent. **Basidia** 1-4 spored, hyaline, elongate to cylindrical, 15 x 3, sterigmata 3 x 0.5-1.0 µm.

Spores ornamented, (18-) 21-25 (-26) x (7-) 8-9 µm excluding ornamentation and attachment, fusiod occasionally subclavate; apex rostrate or occasionally acute, base long-tapered and truncate, occasionally with hyaline sterigmal attachment up to 2 µm long (especially young spores). **Ornamentation** of low, broken ridges or rounded warts up to 1 µm tall (Fig. 7). **Spore wall** ±1 µm thick. **Rostrum** smooth, ±1 (-3) µm long. **Utricle** distinct, appressed, wrinkled but usually not covering rostrum. **Spore color** in KOH golden brown singly, olive brown in mass.

ETYMOLOGY: Latin, referring to the "southern" occurence of this species.

HABIT: Hypogeous; presumed mycorrhizal hosts unknown.

COLLECTIONS EXAMINED: **ARGENTINA**: Buenos Aires, Boca del Riachuelo, leg C. Spegazzini, 22 May 1881 (holotype LPS 13340, isotype NY).

DISCUSSION: The golden brown, rostrate, ornamented spores exclude this taxon from *Hysterangium* and correctly place it in *Hymenogaster*. Horak (**1963**) repeated Spegazzini's (**1917**) recombination of this species into *Hymenogaster*. The generic concept of *Hymenogaster* is confused and the group needs modern evaluation.

Hallingea Castellano, *gen. nov.*

Basidiomata hypogaea vel erumpentia, globosa, subglobosa vel irregularia. Peridium stratis duabus. Epicutis tenuis vel crassa, rubra, vinacea, palllide purpurea, caesia vel violacea; oscure rubra, vinacea vel purpuea contusens; cellulis inflatis; fibulae absentes. Subcutis tenuis vel crassa, plerumque hyphis intertextis sine cellulis inflatis, fibulae absentes. Gleba grisea, griseo-olivacea, oscure olivaceo-brunnea vel purpureo-brunnea, loculis irregularibus vel elongatis, partiale vacuis. Trama hyphis intertextis in matrice gelatinosa, fibulae absentes. Sporae plerumque assymetricales, laeves, anguste ellipsoideae fusiformes, vel irregulares, hyalinae vel pallide virides in KOH; tunica tenuis; utriculus plerumque absens, ubi praesens laxus.

Type species: **HALLINGEA PURPUREUS** (Zeller & Dodge) Castellano

Basidiomata hypogeous to erumpet, globose, subglobose to irregular. **Peridium** two-layered; epicutis thin to thick, red, reddish vinaceous, pale purple to lavender or violet when fresh, bruising dark dull red, vinaceous or purple, inflated cells present, clamp connections absent; subcutis thin to thick, usually of interwoven hyphae without inflated cells, clamp connections absent. **Gleba** gray, grayish olive, dark olive brown to purplish brown, locules irregular to elongate, partially empty. **Columella** present, translucent often with a reduced stipe-columella or arising from a sterile base. **Trama** of interwoven hyphae in a gelatinized matrix, clamp connections absent. **Spores** mostly assymetrical, smooth, fusiform to narrowly ellipsoid or irregular, hyaline to pale green in KOH, spore wall thin, utricle usually absent or when present loose.

ETYMOLOGY: Latin, named for Dr. Roy Halling, mycologist at The New York Botanical Garden.

DISTRIBUTION AND HOSTS: Known only from South America: Argentina and Chile. Probable mycorrhizal associates of *Nothofagus* spp.

DISCUSSION: *Hallingea* is a member of the Boletaceae and is a morphological equivalent to *Truncocolumella* being much reduced from its mushroom ancestor but with some vestigial remnants of sterile tissue. The three species of *Hysterangium sensu lato* placed into the genus *Hallingea* at this time are congeneric with each other and may be related to the genera *Boletus* or *Xerocomus*. Further investigation is needed to elucidate the relationship of *Hallingea* species with bolete relatives. The following three species have spores that are smooth, cylindrical to fusoid and usually lack a utricle and the sporocarp possess a dendroid, gelatinous columella that usually originates from a much reduced basal stipe.

Key to *Hallingea* species

1. Spores 18-20 (-21) µm long; utricle present or absent, peridium less than 250 µm thick..***H. carneoroseus***
1. Spores mostly 15-18 µm long; peridum thicker than 400 µm....................**2**
   2. Peridial epicutis 300-400 µm thick, of parenchyma-like cells inflated to 10-15 µm in diam; subcutis ±500 µm thick, of interwoven hyphae, 6-8(-20) µm in diam....................***H. purpureus***
   2. Peridial epicutis 300-500 µm thick, of parenchyma-like cells 15-40 (-60) µm in diam; subcutis 200-300 µm thick, of interwoven hyphae, 2-4 µm in diam...***H. violaceus***

HALLINGEA CARNEOROSEUS (Horak) Castellano, *comb. nov.*

≡ *Hysterangium carneoroseum* Horak, Sydowia, **17**: 200–201, 1963.

Basidiomata 5–22 mm in diam, globose to pear–shaped, frequently depressed at the base, white when young, becoming red to reddish vinaceous or pale purple on bruising; surface glabrous, KOH yellow, NH_3 red, HCl negative. **Gleba** gray to grayish olive; locules elongate, empty.

Rhizomorphs absent. **Columella** narrow, dendroid, translucent, "rarely with a reduced stipe-columella up to 3 mm long" (Horak 1963).

Peridium 80–150 µm thick, two–layered: epicutis 50–100 µm, of hyaline, thick–walled, interwoven hyphae, 2–4 µm in diam, interspersed with subspherical to irregularly inflated parenchyma–like cells, 7–15 µm in diam; subcutis 30–50 µm, of hyaline, gelatinized, parallel hyphae, 3–4 µm in diam, clamp connections absent.

Trama of hyaline, thin-walled, compactly interwoven hyphae, 2–3 µm in diam, in a gelatinized matrix, appearing very coarse. **Basidia** hyaline, thin-walled, cylindrical, 15–25 x 5–7 µm, 4 spored.

Spores asymmetrical, smooth, 18–20 (–21) x 5–6 µm, narrowly ellipsoid to elongate; apex blunt, base sessile to slightly pedicellate (Fig. 8). **Spore wall** less than 0.5 µm thick. **Utricle** absent or when present wrinkled, loosely adhering to spore. **Spore color** in KOH hyaline to pale green singly, pale green in mass.

ETYMOLOGY: Latin, referring to fresh sporocarps which bruise "flesh to pink" when handled.

HABITAT AND SEASON: Hypogeous or epigeous; probable mycorrhizal associates *Nothofagus antarctica, N. betuloides, N. dombeyi* or *N. pumilio;* March.

COLLECTIONS EXAMINED: **ARGENTINA**: Tierra del Fuego, Valle del Glaciar Martial, leg E. Horak 64/23 (holotype ZT, isotype LPS 38204).

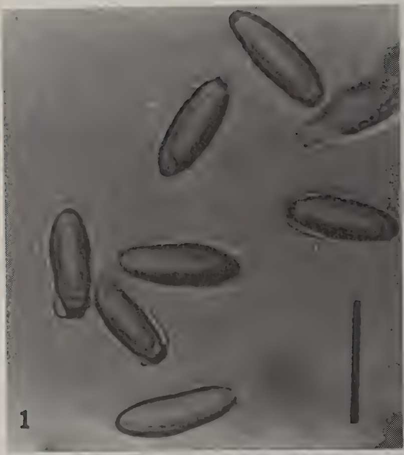
DISCUSSION: Known only from the holotype collected under *Nothofagus* spp. in Argentina. The asymmetrical, narrowly ellipsoid to elongate spores and reduced stipe-columella exclude this species from *Hysterangium.*

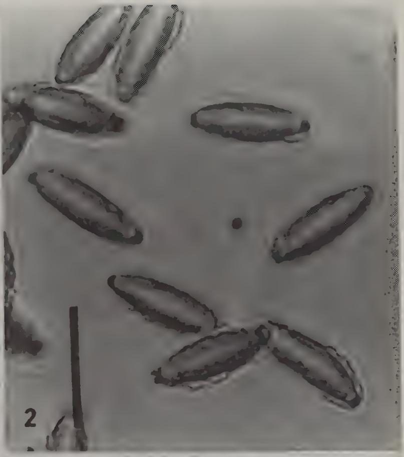
Hallingea carneorosea is distingushed from other *Hallingea* species by its large spores and relatively thin peridium.

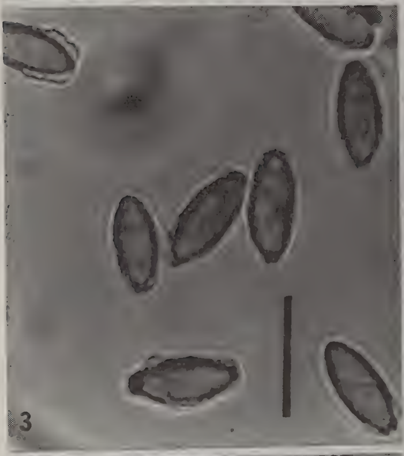
HALLINGEA PURPUREUS (Zeller & Dodge) Castellano, *comb. nov.*

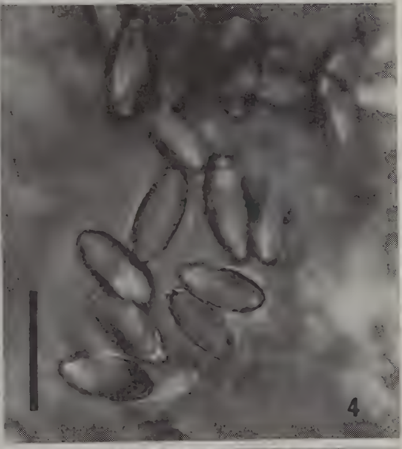
≡ *Hysterangium purpureum* Zeller & Dodge, Ann. Mo. Bot. Gard. **16**: 110–111. 1929.

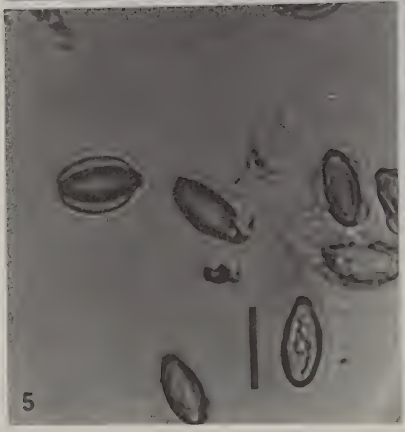
Figs. 7-10. Basidiospores of *Hymenogaster australe* and *Hallingea* spp. **7.** *H. australe*, LPS 13340, bar = 25 µm. **8.** *H. carneoroseus*, ZT 64/23, bar = 20 µm. **9.** *H. purpureus,* Garrido 418A, bar = 18 µm. **10.** *H. violaceus*, ZT 64/24, bar = 20 µm.

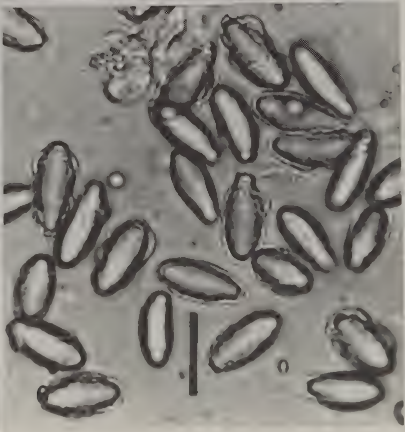

1


2


3


4


5



Basidiomata up to 2 cm in diam, globose, subglobose to irregular, bright lavender when fresh, dark lavender to purplish red at maturity, becoming dark dull red on bruising, grayish olive to pale olive when dry except in crevasses which are dull lavender, surface smooth except for a fine pubesence in protected areas. **Gleba** purplish brown to almost black at maturity (Halling 1981); locules elongate, partially filled. **Rhizomorphs** numerous, small, attached to reduced stipe. **Columella** gelatinous, distinct, dendroid, translucent, continuous with a reduced stipe up to 4 mm long.

Peridium not easily separable from gleba, 500–900 µm thick, two-layered; epicutis 300–400 µm thick, of hyaline, thin–walled, spherical cells, 10–15 µm in diam, clamp connections absent; subcutis 500 µm thick, of hyaline, thin–walled, gelatinized, compactly interwoven hyphae, 6–8 µm in diam, occasional cells inflated up to 15–20 µm or rarely 60–70 µm in diam, the larger cells being near the epicutis, clamp connections absent.

Trama 50–110 µm thick, of hyaline, thin-walled, interwoven hyphae, 2–3 µm in diam, in a gelatinized matrix, clamp connections absent. **Basidia** hyaline, thin-walled, cylindrical, 35–40 x 6–7 µm, 4 (5) spored.

Spores commonly asymmetrical, smooth, 15–18 (–19) x 5–6 µm, fusiform, narrowly ellipsoid to irregular; apex acute, base subsessile to appendaged (Fig. 9). **Spore wall** less than 0.5 µm thick. **Utricle** absent. **Spore color** in KOH hyaline to pale green or brown singly, pale yellowish brown in mass.

ETYMOLOGY: Latin, referring to the bright lavender color of the fresh peridium.

HABITAT AND SEASON: Hypogeous; probable mycorrhizal associates *Nothofagus* sp.; February and April.

COLLECTIONS EXAMINED: **CHILE**: Puntas Arenas, 24 February 1906, leg R. Thaxter 4716 (lectotype dried material, NY, isotypes, dried material FH, wet material FH, NY). OTHER COLLECTIONS: **CHILE**: Concepción, leg Garrido 418–A (OSC).

DISCUSSION: The asymmetrical, narrowly ellipsoid spores and reduced stipe-columella place this species in *Hallingea* . Horak (**1980**) synonymized *Hallingea violaceus* (as *Hysterangium violaceum*) with *H. purpureus* (as *Hysterangium purpureum*) without studying the type of the latter. These are distinct species as *H. purpureus* has both thicker peridial layers and subcuticular tissues and wider, non-appendaged spores.

It fruits "by the dozen growing in groups 2–3 to 20" (Thaxter's field notes cited in Halling **1981**).

HALLINGEA VIOLACEUS (Horak) Castellano, *comb. nov.*

≡ *Hysterangium violaceum* Horak, Sydowia **17**: 198–200. 1963.

Basidiomata 0.8–1.5 (–2) cm in diam, globose to ovoid or depressed, indented at the base, violet at maturity, bruising lilac purple to lavender, reddish brown or pale brown with dark violet areas when dried, surface tomentose, without adherent soil particles. **Gleba** olive when young, dark olive to dark olive brown when dried; locules irregular to elongate, empty. **Rhizomorphs** not seen. **Columella** distinct, dendroid, arising from a sterile base, white to brown when dried. **Odor** unpleasant to indistinct.

Peridium not separable from gleba, 500–800 μm thick, two–layered; epicutis 300–500 μm thick, of pale red, thin–walled, compact, spherical to polyhedral cells, 15–40 (–60) μm in diam, clamp connections absent; subcutis 200–300 μm thick, of hyaline, thin–walled, bead–like, compactly interwoven hyphae, 2–4 μm in diam, clamp connections absent.

Trama 30–125 μm thick, of hyaline, thin-walled, occasionally collapsed, elongate, interwoven to subparallel hyphae, 2–3 μm in diam, in a gelatinized matrix, clamp connections absent. **Basidia** not observed.

Spores commonly asymmetrical, smooth, (12–) 16–18 (–20) x 4–5 (–6) μm, mostly elongate, occasionally narrowly ellipsoid or irregular; apex acute, base appendaged (Fig. 10). **Spore wall** less than 0.5 μm thick. **Utricle** absent. **Spore color** in KOH pale green singly, green in mass.

ETYMOLOGY: Latin, in reference to the violet fresh peridium.

HABIT, HABITAT AND SEASON: Hypogeous; probable mycorrhizal associates *Nothofagus dombeyi*, *N. betuloides*, or *N. pumilio*; May.

COLLECTIONS EXAMINED: **ARGENTINA**: Patagonia, Rio Negro, 12 May 1962, leg E. Horak 64/24–483 (holotype ETH, isotype LPS 38203).

DISCUSSION: The asymmetrical, narrowly ellipsoid spores and distinct columella place this species in *Hallingea* .

ACKNOWLEDGMENTS

This research was funded in part by a travel grant from CNP (Brazil) to the junior author. Partial funding for this work was provided by National Science Foundation Grant BSR-9201421. We appreciate the assistance of Dr. James M. Trappe with the Latin and critical review of the manuscript. We appreciate the helpful comments of Dr. Ross Beever. We appreciate loan of specimens from the following herbaria and individuals: Universidad de Buenos Aires, Argentina (BAFC), Farlow, Harvard University, Boston, Massachusetts (FH), University of Tasmania, Hobart, Australia (HO), Royal Botanic Gardens, Kew, England (K), Instituto de Botánica "Spegazzini," La Plata, Argentina (LPS), Dr. Roy Halling and the New York Botanical Garden, Bronx (NY), Landcare Research, Auckland, New Zealand (PDD), and Dr. E. Horak, Institut für Spezielle Botanik, Zürich, Switzerland (ETH).

LITERATURE CITED

Beaton, G., Pegler, D.N., and Young, T.W.K. 1985. Gastroid Basidiomycota of Victoria state, Australia: 4. *Hysterangium. Kew Bulletin* 40: 435–444.

Castellano, M.A., and R.E. Beever. 1994. Truffle-like Basidiomycotina of New Zealand: *Gallacea, Hyterangium, Phallobata,* and *Protubera. New Zealand Journal of Bot.any* 32: 305-328.

Castellano, M.A., and Trappe, J.M. 1990. Australasian truffle-like fungi. I. Nomenclatural bibliography of type descriptions of Basidiomycotina. *Australian Systematic Botany* 3: 653-670.

Castellano, M.A., and Trappe, J.M. 1992. Australasian truffle-like fungi. V. Nomenclatural bibliography of type descriptions of Ascomycotina and Zygomycotina. *Australian Systematic Botany* 5: 631-638.

Halling, R. 1981. Thaxter's thaxterogasters and other Chilean hypogeous fungi. *Mycologia* 73: 853-868.

Holmgren, P.K. and Keuken, W. 1974. Index Herbariorum. Part I. The Herbaria of the World. Oosthoek, Scheltema and Holkema, Utrecht, The Netherlands. 397 pp.

Horak, E. 1963. Fungi austroamericani V. *Sydowia* 17: 197–205.

Horak, E. 1980. Fungi, Basidiomycetes, Agaricales y Gasteromycetes Secotioides. *Flora Criptogám. de Tierra del Fuego* 11(6): 1–524.

Smith, A.H. and Zeller, S.M. 1966. A preliminary account of the North American species of *Rhizopogon. Memoirs of the New York Botanical Garden* 14: 1–178.

Spegazzini, C. 1917. Breves apuntes sobre Hymenogastreas Sud–Americanas. *Rev. Chilena Hist. Nat.* 21: 167–171.

Zeller, S.M., and Dodge, C.W. 1929. *Hysterangium* in North America. *Annals of the Missouri Botanical Garden* 16: 83-128.

MYCOTAXON

Volume LVII, pp. 347-352 January-March 1996

Fungi from palms. XXIV. The genus *Bondiella*

Kevin D. Hyde

Department of Ecology and Biodiversity, University of Hong Kong, Pokfulam Road, Hong Kong.

Abstract

Bondiella was described from leaf blades of dried fallen palm fronds collected in Tanzania. Ascospores are reddish-brown, finely echinulate and two celled and surrounded by a mucilaginous sheath, while asci are bitunicate and contain 24 ascospores. The taxon is redescribed and illustrated with interference contrast micrographs and its placement at the family level is discussed.

Introduction

Bondiella Piroz. is represented by single species *B. palmicola* Piroz., which was described from dried palm leaf blades collected in Tanzania (Pirozynski, 1972). In this paper, part of a series on the fungi developing on palms, it is redescribed and illustrated with interference contrast micrographs. Pirozynski (1972) placed this genus in the Pseudosphaeriales, while Arx & Müller (1975) included it in the Pleosporales. Recent treatments (Eriksson & Hawksworth, 1991, 1993) refer it to the Mesnieraceae, Dothideales.

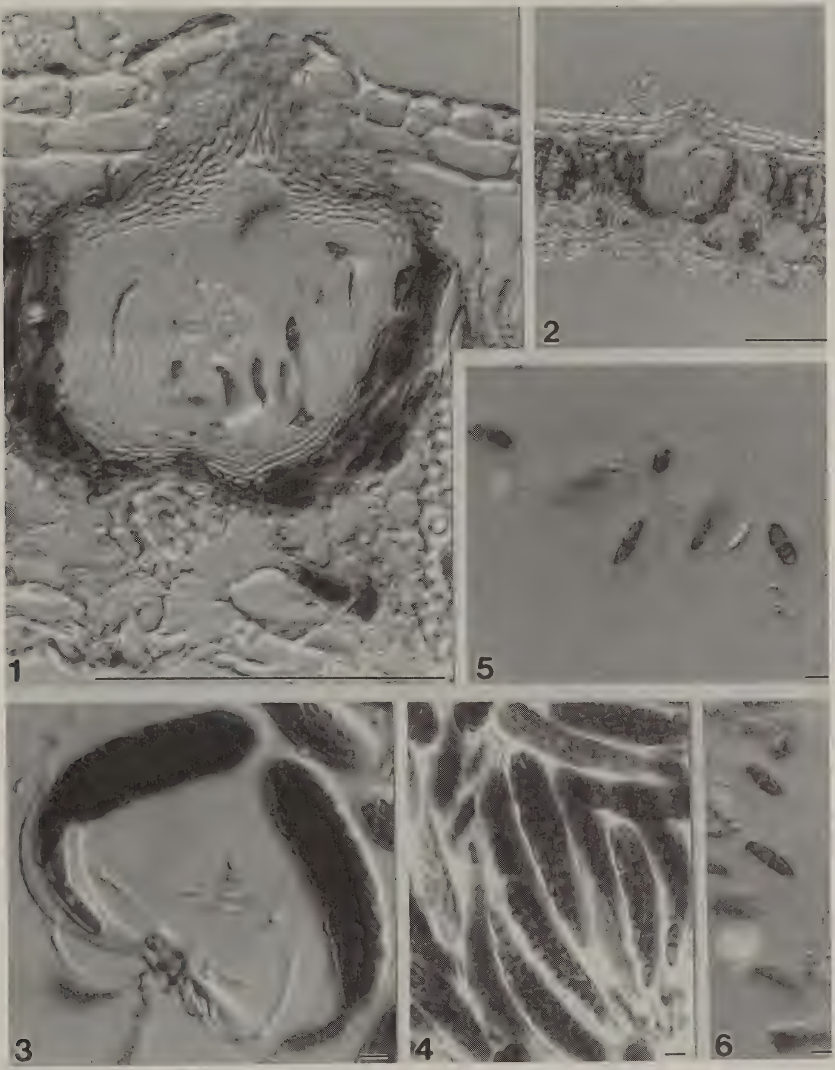
Taxonomy

Bondiella Piroz., Mycol. Pap. 129: 5. 1972.

Ascomata subglobose, immersed in the mesophyll, ostiolate, mostly solitary. Neck erumpent through the upper epidermis, comprising elongated columnar cells. - Peridium comprising a few layers of elongate cells, fusing at the outside with the mesophyll. - Pseudoparaphyses hypha-like, sheet-like, numerous, septate and embedded in a gelatinous matrix. - Asci 24-spored, cylindric-clavate, bitunicate, pedunculate, apically rounded, with an ocular chamber. - Ascospores multiseriate, ellipsoidal, dark reddish-brown, echinulate, two celled, constricted at the septum, surrounded by a thick mucilaginous sheath.

Type species: *Bondiella palmicola* Piroz.

Bondiella was thought to be related to *Stegasphaeria* Syd. and *Mesniera* Sacc. & Syd. (Pirozynski, 1972). There has been no recent treatment of *Stegasphaeria*, but *Mesniera* was treated by Eriksson (1981). In *Stegasphaeria* ascomata are formed on stromatic complexes in distinct spots on living leaves, the ascospores are two-celled, but the asci are 8-spored (Müller & Arx, 1962). In the monotypic *Mesniera*, asci lack ring structures and are multispored, while ascospores are ovoid-ellipsoidal, 1-celled and provided with longitudinal irregular striations. Ascomata are immersed in yellowish-green necrotic patches and arranged in concentric rings (Arx & Müller, 1954; Eriksson, 1981). In both genera ascospores are released through histolysis of the upper peridium (Pirozynski, 1972). Because *Mesniera* and *Stegasphaeria* are referred to the family Mesnieraceae by Eriksson (1981) and *Bondiella* is considered to be related by Pirozynski (1972), this may account for the latter genus also being included in this family.



Figures 1-6. Interference contrast micrographs of *Bondiella palmicola*. 1, 2. Sections of ascoma. Note the columnar cells of the neck. 3, 4. Bitunicate asci. 5, 6. Ascospores which are brown, two-celled and surrounded by a mucilaginous sheath. Bars = 10 μm

Consideration is therefore made to find a more suitable family for *Bondiella*.

Hawksworth (1985) reviewed 35 genera of ascomycetes with bitunicate asci and brown two-celled ascospores, but did not treat *Bondiella*, which keys to *Polycoccum*. This is a genus of 20 species, all of which are lichenicolous, many forming galls on the host lichens, placed in the Dacampiaceae (Eriksson & Hawksworth, 1993) and is clearly unrelated to *Bondiella*.

In Barr (1987) *Bondiella* keys to the Pleosporales and either the Phaeosphaeriaceae or Mesnieraceae. Barr (1987) did not discuss *Bondiella* or the Mesnieraceae, while in the Phaeosphaeriaceae *Bondiella* keys to *Didymella* Sacc. In *Didymella*, however, ascospores are usually hyaline and 8-spored and therefore unsuitable. In *Mesniera* ascomata are densely gregarious, immersed in concentric rings and open by a lysiginous pore. Asci contain 16 ascospores, are cylindric-clavate, bitunicate and lack an ocular chamber or ring structures. Ascospores are ovoid ellipsoidal, dark brown and provided with longitudinal ridges, without a mucilaginous sheath. *Bondiella* differs in many respects and its inclusion in the Mesnieraceae is questionable. However, I have no better alternative for the placement of this genus and therefore it should remain in the Mesnieraceae.

Bondiella palmicola Piroz., Mycol. Pap. 129: 6. 1972. - Figs 1-6.

Ascomata 100-160 μm diam, 120-180 μm high, subglobose, immersed in the mesophyll, ostiolate, mostly solitary (Figs. 1, 2). Neck up to 60 μm long, erumpent through the upper epidermis, comprising elongated columnar cells (Fig. 1). - Peridium up to 20 μm wide, comprising a few layers of inwardly hyaline and outwardly brown-walled elongate cells, fusing at the outside with the mesophyll (Fig. 1). -

Pseudoparaphyses hypha-like, sheet-like, numerous, septate and embedded in a gelatinous matrix (Fig. 1). - Asci 80-100 x 15-20 μm, 24-spored, cylindric-clavate, bitunicate, short pedunculate, apically rounded, with an ocular chamber (Figs. 3, 4). - Ascospores 11-17 x 4.5-5 μm, multiseriate, ellipsoidal, dark reddish-brown, bicelled, constricted at the septum, finely echinulate, surrounded by a thick mucilaginous sheath (Figs. 5, 6).

Known distribution: Tanzania.

Known host: *Elaeis*.

Material examined: Tanzania, Kigoma, Kakombe, on dead leaf blade of dried fallen rachis of *Elaeis guineensis*, 19 July 1963, K.A. Pirozynski M26c, IMI 105789c (holotype).

Acknowledgments

M.E. Barr is thanked for discussions on this taxon. The curator of IMI is thanked for loan of type material. Mr A.Y.P. Lee is thanked for photographic and Miss H. Leung is thanked for technical assistance.

References

Arx, J.A. v. & Müller, E. (1954). Die Gattungen der amerosporen Pyrenomyceten. - Beitr. Kryptogammenfl. Schweiz 11: 1-434.

Arx, J.A. v. & Müller, E. (1975). A re-evaluation of the bitunicate ascomycetes with keys to families and genera. - Studies in Mycology 9: 159,.

Barr, M.E. (1987). Prodromus to Class Loculoascomycetes. - Amherst, Massachusetts, published by the author.

Eriksson, O.E. (1981). The families of bitunicate ascomycetes. - Opera Botanica 60: 1-220.

Eriksson, O.E. & D.E. Hawksworth (1991). Outline of the ascomycetes - 1990. - Systema Ascomycetum 9: 39-271.

Eriksson, O.E. & D.E. Hawksworth (1993). Outline of the ascomycetes - 1993. - Systema Ascomycetum 12: 51-257.

Hawksworth, D.L. (1985). A redisposition of the species referred to the ascomycete genus *Microthelia*. - Bull. Br. Mus. (Nat. Hist.) Bot. 14: 43-181.

Müller, E. & J. A. v. Arx (1962). Die Gattungen der didymosporen Pyrenomyceten. - Beitr. Kryptogamenflora Schweiz 11: 1-992.

Pirozynski, K.A. (1972). Microfungi of Tanzania. Mycol. Pap. 129: 1-64.

MYCOTAXON

Volume LVII, pp. 353-357 January-March 1996

Fungi from palms. XXV. *Pestalosphaeria elaeidis*.

Kevin D. Hyde

Department of Ecology and Biodiversity, University of Hong Kong, Pokfulam Road, Hong Kong.

Abstract

Leptosphaeria elaeidis was described as an isolate from oil palm seedlings in Nigeria. Ascospores were brown and two septate, while asci were cylindrical with a J+ subapical ring. As the species was amphisphaeriaceous it was later transferred to *Pestalosphaeria*. In this paper, *Pestalosphaeria elaeidis* is redescribed and illustrated with interference contrast micrographs.

Introduction

The amphisphaeriaceous genus *Pestalosphaeria* M.E. Barr was introduced to accommodate *P. concentrica* M.E. Barr, a leaf spotting pathogen of *Rhododendron*. Characteristics included ascomata immersed under a slight clypeus, cylindrical asci with a J+ subapical ring, 2-septate striate brown ascospores and a *Pestalotiopsis* anamorph (Barr, 1975). Van der AA (1976) transferred *Leptosphaeria elaeidis* C. Booth & J.S. Robertson to *Pestalosphaeria* on account of the asci being unitunicate and provided with a J+ subapical ring. Further species were added by Nag Raj (1979, 1985), Samuels *et al*. (1987), Shoemaker & Simpson (1982) and Zhu *et al*. (1991). This brings the total number of *Pestalosphaeria* species to eight. In this paper, which is part of a series on the ascomycetes occurring on palms, *Pestalosphaeria elaeidis* is redescribed and illustrated. Keys to the genus are provided by Nag Raj (1985) and Zhu *et al.* (1991). A list of *Pestalosphaeria* species is provided on Table 1.

Table 1. *Pestalosphaeria* species.

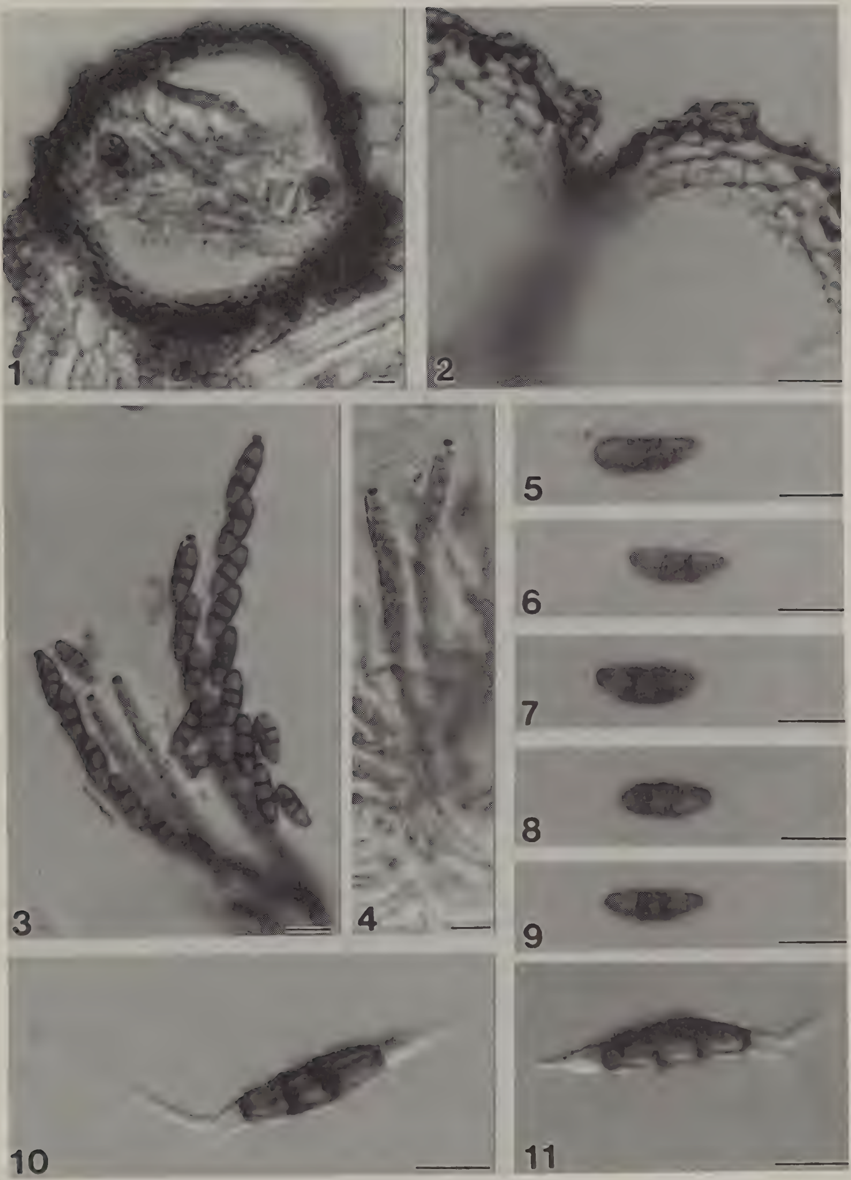
P. accidenta P.L. Zhu, Q.X. Ge & T. Xu, Mycotaxon 40: 130. 1991.
P. austro-americana Nag Raj & Dicosmo, Canadian Journal of Botany 57: 2494. 1979.
P. concentrica M.E. Barr, Mycologia 67: 188. 1975.
P. elaeidis (C. Booth & J.S. Robertson) Aa, Verh. K. ned. Akad. Wet. Ser 2 67: 87. 1976.
P. hansenii Shoemaker & J.A. Simpson, Canadian Journal of Botany 59: 986. 1982.
P. jinggangensis P.L. Zhu, Q.X. Ge & T. Xu, Mycotaxon 40: 133. 1991.
P. leucospermi Samuels, E. Müll. & O. Petrini, Mycotaxon 28: 475. 1978.
P. varia Nag Raj, Mycotaxon 22: 57. 1985.

Taxonomy

Pestalosphaeria elaeidis (Booth & Robertson) Aa, Verh. K. ned. Akad. Wet. Ser. 2, 67: 87. 1976. - Figs 1-11.

≡ *Leptosphaeria elaeidis* C. Booth & J.S. Robertson, Trans. Brit. Mycol. Soc. 44: 24. 1961.

Ascomata 120-150 μm diam, 200-250 μm high, subglobose, immersed in the mesophyll, ostiolate, brown, mostly solitary (Fig. 1). - Peridium 9-16 μm wide, comprising a few layers of brown-walled angular cells (Fig. 2). - Paraphyses hypha-like, poorly preserved, amphisphaeriaceous.



Figures 1-11. Interference contrast micrographs of *Pestalosphaeria elaedis*. 1. Section of ascoma. 2. Peridium. 3, 4. Unitunicate asci with J+ subapical ring. 5-9. Ascospores. 10, 11. Conidia. Bars = 10 μm

- Asci 86-102 x 6-8 μm, 8-spored, cylindrical, unitunicate, pedunculate, apically rounded, with a J+, subapical, wedge-shaped ring, 2 μm diam, 1.75-2 μm high. (Figs. 3, 4). - Ascospores 12-21 x 4.5-6 μm, uniseriate, ellipsoidal, or oblong inequilateral, brown, 2-septate, slightly constricted at the septa (Figs. 5-9). Conidia (23-) 27-34 x 6-7 (-10) μm, fusiform to ellipsoidal, widest in the middle, 4-septate, middle three cells brown, concolorous, terminal cells hyaline, with 2-3 apical appendages and one basal appendage.

Anamorph: *Pestalotiopsis* sp.
Known distribution: Nigeria.
Known host: *Elaeis*.

Material examined: Nigeria, isolated from leaves of *Elaeidis guineensis*, Sept 1955, IMI 61175 (holotype).

Booth & Robertson (1961) reported that *Leptosphaeria elaeidis* had also been isolated from sugarcane in Jamaica by Dr H.J. Hudson. I would suggest that it is unlikely that this is the same species. Numerous *Pestalotiopsis* species are recognized (Guba, 1961) and similarly one may expect that there are numerous *Pestalosphaeria* species, but this stage is rarely observed.

Acknowledgments

The curator of IMI is thanked for loan of type material. Margaret Barr is thanked for discussions concerning this taxon. Mr A.Y.P. Lee is thanked for photographic and Miss H. Leung is thanked for technical assistance.

References

Aa, H.A. van der (1976). Progress Report. - Verhandelingen der K Nederlandsche Akadamie van Wetenschappen 67: 86-87.

Barr, M.E. (1975). *Pestalosphaeria*, a new genus in the Amphisphaeriaceae. - Mycologia 67: 187-194.

Booth, C. & Robertson, J.S. (1961). *Leptosphaeria elaeidis* sp. nov. isolated from anthracnosed tissue of oil palm seedlings. - Transactions of the British Mycological Society 44: 24-26.

Guba, E.F. (1961). Monograph of *Monochaetia* and *Pestalotia*. Harvard University Press. Cambridge, Massachusetts, U.S.A..

Nag Raj, T.R. (1985). Miscellaneous microfungi, III. - Canadian Journal of Botany 57: 2489-2496.

Nag Raj, T.R. (1985). Redisposals and redescriptions in the *Monochaetia - Seridium*, *Pestalotia - Pestalotiopsis* complexes II, *Pestalotiopsis besseyic* (Guba) comb. nov. and *Pestalosphaeria varia* sp. nov. - Mycotaxon 22: 52-63.

Samuels, G.S., Müller, E. & Petrini, O. (1987). Studies in the Amphisphaeriaceae (sensu Lato) 3. New species of *Monographella* and *Pestalosphaeria*, and two new genera. - Mycotaxon 28: 473-499.

Shoemaker, R.A. & Simpson, J.A. (1982). A new species of *Pestalosphaeria* on pine with comments on genetic placement of the anamorph. - Canadian Journal of Botany 59: 986-991.

Zhu, P., Ge, Q. & Xu, T. (1991). The perfect stage of *Pestalotiopsis* from China. - Mycotaxon 40: 129-140.

MYCOTAXON

Volume LVII, pp. 359-369 January-March 1996

PAULIA CAESPITOSA SP. NOV. AND P. WRIGHTII COMB. NOV. (LICHINACEAE, ASCOMYCOTINA)

Mauro Tretiach
Dipartimento di Biologia, Universita' degli Studi di Trieste
Via Giorgieri 10, I - 34127 Trieste, Italy

Aino Henssen
Fachbereich Biologie der Philipps-Universität,
Karl-von-Frisch-Straße, D - 35032 Marburg/Lahn, Germany

Abstract - The lichen species *Paulia caespitosa* Tretiach & Henssen is described as new from Chihuahua, Mexico. It is characterized by a fruticulose, blackish thallus with branched and terete lobules, a non-amyloid hymenium, and eight-spored asci. The new combination *Paulia wrightii* (Tuck.) Tretiach & Henssen is proposed, and a new locality of this species is reported. The differences among *Paulia* species with a subfruticulose habit are discussed.

Introduction

The authors have recently started a revision of the *Lichinaceae* (Ascomycotina) of the Sonora Desert (SW North America) in the framework of the "Sonoran Desert Lichen Flora Project" directed by Prof. Th. H. Nash III (Arizona State University). When studying the samples preserved in ASU, one of us (M.T.) examined a small, fruticose lichen distributed as *Peccania sp. indet.* by Weber in Lich. Exs. 576. This lichen has short, cylindrical conidia, and therefore does not belong to the genus *Peccania* which has filiform, sigmoid pycnospores (Massalongo 1856). A more detailed morphological and xanatomical analysis revealed that the lichen distributed by Weber could be better placed in *Paulia.* However, none of the known species of *Paulia* (Henssen 1986, Henssen & Jørgensen 1990, Henssen &

Tretiach 1994) corresponds to this peculiar, fruticose lichen, whose formal description is given below. Furthermore, some cyanophilic lichens described by Tuckerman were also investigated for comparison. *Omphalaria wrightii* was of special interest, because some characters that are mentioned in the diagnosis and in the description given by Nylander (1876) indicated that the species might be a member of *Paulia*. The examination of the type material revealed that *O. wrightii* is indeed a *Paulia* species, and the new combination is proposed herein.

Material and Methods

The acronyms of the herbaria follow Index Herbariorum (Holmgren *et al.* 1990); hb. Henssen refers to the private herbarium of the author.

Sections of the lichen were prepared by means of a cryostat microtome (Reichert Histostat) or a freezing microtome (Jung), and embedded in lactic-glycerine and cotton-blue, with or without phenol, or in erythrosin; semi-permanent slides are kept in TSB and hb. Henssen. For studying the iodine reaction, Lugol's solution was added to sections and squash preparations without pretreatment with KOH. Specimens were photographed in a dry condition if not indicated otherwise. The measurements given refer to semi-permanent preparations in LPCB. *C.* 30 ascospores from different thalli were measured.

The following material was studied for comparison: *Paulia gibbosa* Henssen: Bermuda, Smith's parish, North Point, on limestone at seashore, 1964, Henssen 17277b (MB - *holotypus*). *Paulia glomerata* Henssen & Tretiach: Slovenia, upper Isonzo Valley, between Zaga and Bovec, Rio Boka fall, on calcareous face, *c.* 380 m, 1993, G. Bolognini, A. Rondi & M. Tretiach 16851 (TSB - *holotypus*, hb. Henssen - *isotypus*). *P. japonica* Asahina: Japan, Shikoku, prov. Tosa, Mt Yokogura, on calcareous rocks, 1931, Fujikawa (TNS - *holotypus*).

Results and Discussion

Paulia caespitosa Tretiach & Henssen **sp. nov.**

(Figs. 1-2)

Thallus nigricans, fruticulosus, ad 10-15 mm latus, ramosissimus, olivaceo-viridis sed subtus pallidior, homoiomerus. Laciniae erectae, usque ad 0.25-0.35 mm latae, dense ramosae, strato amorpho hyalinoque protectae. Hyphae reticulum regulare formantes. Cyanobions ad ordo Chroococcales pertinens, cellulae c. 10-20 x 7-12 µm latae; particulae in vaginam gelatinosam depositae. Apothecia immersa, rara, disco fusco margine thallodes circumdato. Hymenium in iodo non caerulescens, paraphysibus ramificatis excipulumque proprium destitutum. Asci cylindracei, 80-120 x 10-14 (-17) µm, octospori. Sporae simplices, hyalinae, subsphaericae vel rarius ellipsoideae, 11-16 x 9-14 µm, halonatae; halo crassus, c. 2-3 (-4.5) µm latus. Pycnidia immersa, punctiformia, impresso indicata; conidia simplicia, cylindrica, 3-5 x 1 µm.

Type: University of Colorado Museum, Lich. Exs. 576. México, southwestern Chihuahua, Mpio. Bocoyna, valley of Basiguare, 21 km S of Cusarare; on dripping ledges above stream in pine-oak forest, c. 2000 m sm. Small fruticose lichen with *Xanthocapsa* as phycobiont, ecorticate but with dense medulla, forming solid crumbly stands on vertical rock faces, 1 August 1977, W.A. Weber & Robert Bye (COLO -*holotypus*; ASU, FH, GZU, H, MIN, S, TSB, hb. Henssen - *isotypi*).

Thallus black, greenish when wet, fruticulose, to 10 - 15 mm in diam., richly branched, attached by a thick rhizoid strand to the substratum. Lobules erected, to 0.25-0.35 mm in diam., ramified, with the surface covered by a thick, hyaline layer penetrated by thin hyphae. Hyphae of the lobules 1-2 µm wide, forming a thin mesh around the cells of the cyanobiont, that are penetrated by haustoria. Cyanobiont probably a member of the Chroococcales, cells single or more rarely in pairs, 10-20 x 7-12 µm, with a thick gelatinous sheath that is evidently zonate and often filled by particles. Apothecia rare, immersed, to 0.15 mm wide, surrounded by a thick thalline margin, with a reddish-brown disc, flat and circular in shape. Hymenium not amyloid, with a well-developed subhymenium, formed by a hyphal network staining strongly blue in LPCB, limited by a thin layer of branched hyphae at its margin. Paraphyses richly branched and anastomosing, 1-1.5 (-2) µm wide. Asci cylindrical, 80-120 x 10-14 (-17) µm, regularly 8-spored, the walls appressed to the ascospores, and a I- uniform gelatinous outer layer. Ascospores usually uniseriate, simple, colourless, sphaerical or broadly ellipsoid, 11-16 x 9-14 µm, with a thick, two-layered wall, better visible in water mounts, 2-3 (-4.5) µm thick. Sometimes, some bigger, aberrant ascospores, up to 23 x 15 µm, are present. Pycnidia immersa, simple; conidia cylindrical, *c.* 3-5 x 1 µm.

The epithet "caespitosa" refers to the characteristic growth-form of the thallus, formed by clustered, terete lobules.

REMARKS ON MORPHOLOGY AND THALLUS STRUCTURE - The fruticulose thalli of *Paulia caespitosa* are formed by terete, branched lobules, ovoid or irregularly cylindrical in shape, densely aggregated together (Fig. 1 D), with a thick, hyaline layer on the surface (Fig. 2 D). Young thalli form small, regular, spherical cushions (Fig. 1 A-B), resembling in their morphology *Synalissa symphorea* (Ach.) Nyl., and are attached to the substratum by a thick rhizoidal strand, up to 0.4 mm in diam. Old thalli are often more irregular in shape, because some portions of the cushions have been lost, and the remaining parts are connected only by branches (Fig. 1 C) with a central strand of highly agglutinated, thick-walled hyphae, and a thin layer of surrounding tissue (Fig. 2 A-B). However, in old, irregular thalli the lobules are densely aggregated together, and the protruding tips of the lobules, up to 0.35 mm in diam, form the external surface. As in other species of *Paulia*, the cells of the cyanobiont are frequently elongated when penetrated by the finger-like haustoria of the mycobiont; their gelatinous sheath is usually filled with particles of unknown nature (Henssen 1986), distinctly visible by DIC in water mounts (Fig. 2 E). Only rarely, near the lichen surface, the sheath of the cyanobiont cells is pigmented. The newly described species is rarely fertile (Fig. 1 G); however, the abundant material distributed by Weber allowed to verify that the apothecia arise from a cone-shaped hyphal web of generative tissue, as is characteristic of other species of *Paulia*. An excipulum is not developed (Fig. 2 C), the ascospores are regularly uniseriate (Fig. 2 F-H) in cylindrical asci (Fig. 2 G), and the paraphyses are slightly branched and anastomosing. Pycnidia are more frequent than apothecia. They are rather small, and their wall is not convoluted. In this species the cylindrical conidia are larger than in other species of the same genus, reaching 5 µm in length (Fig. 2 I).

ECOLOGY AND DISTRIBUTION - The newly-described *Paulia caespitosa* was collected on limestone, on a vertical face within a mixed wood with *Cupressus arizonica*, *Pinus engelmannii, P. strobiliformis,* and *Quercus crassifolia.* In this locality the species was fairly common, and it was easy to collect 60 samples which were then distributed as exsiccatum (Weber, pers. comm.).

SYSTEMATIC REMARKS - The core of the genus *Paulia* is formed by 9 species that are rather uniform in habit, having orbicular thalli with an effigurate, crenulate or slightly lobate margin (Henssen 1986, Henssen & Jørgensen 1990). Two other species of this genus, P. *glomerata* and *P. japonica*, have a more or less fruticulose habitus (Henssen & Jørgensen 1990, Henssen & Tretiach 1995); they differ from *P. caespitosa* in external morphology and in the size of the conidia.

Paulia glomerata has been recently described from the Southeastern Alps (Henssen & Tretiach 1995) where it is locally

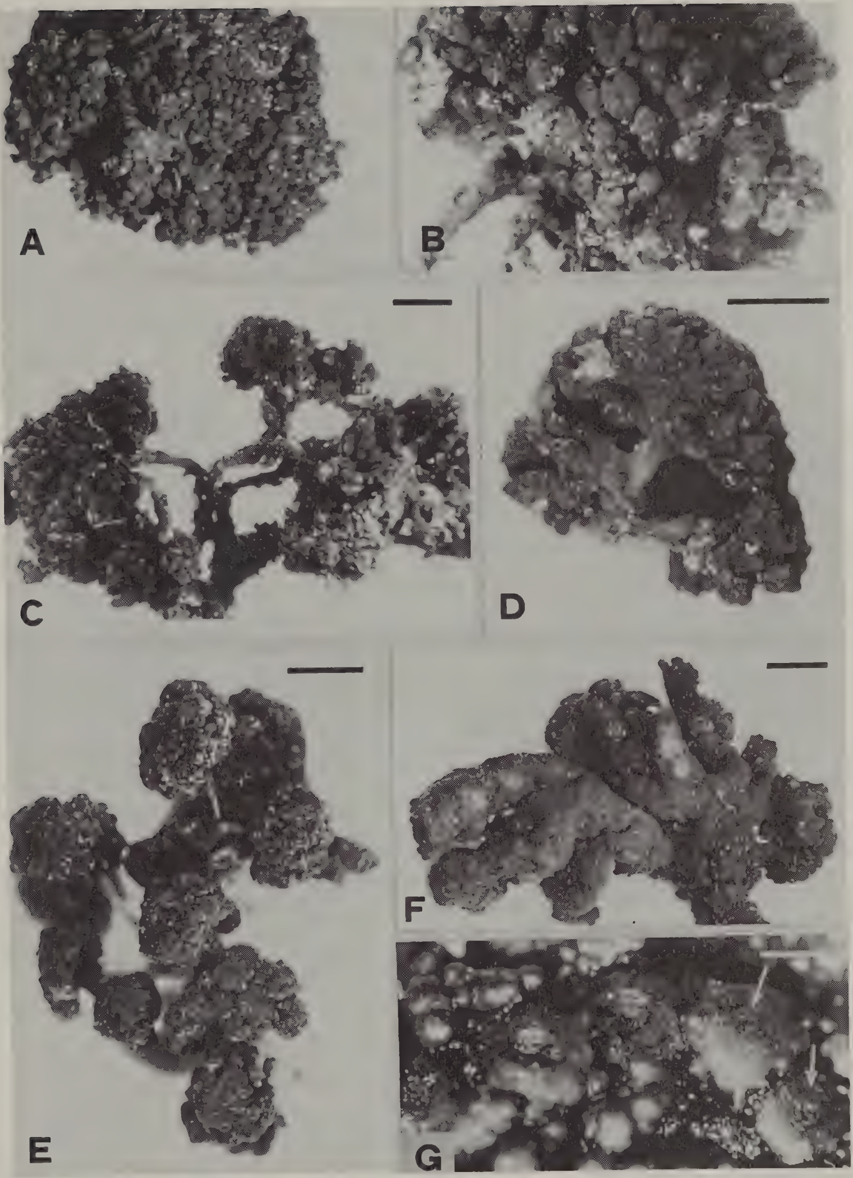
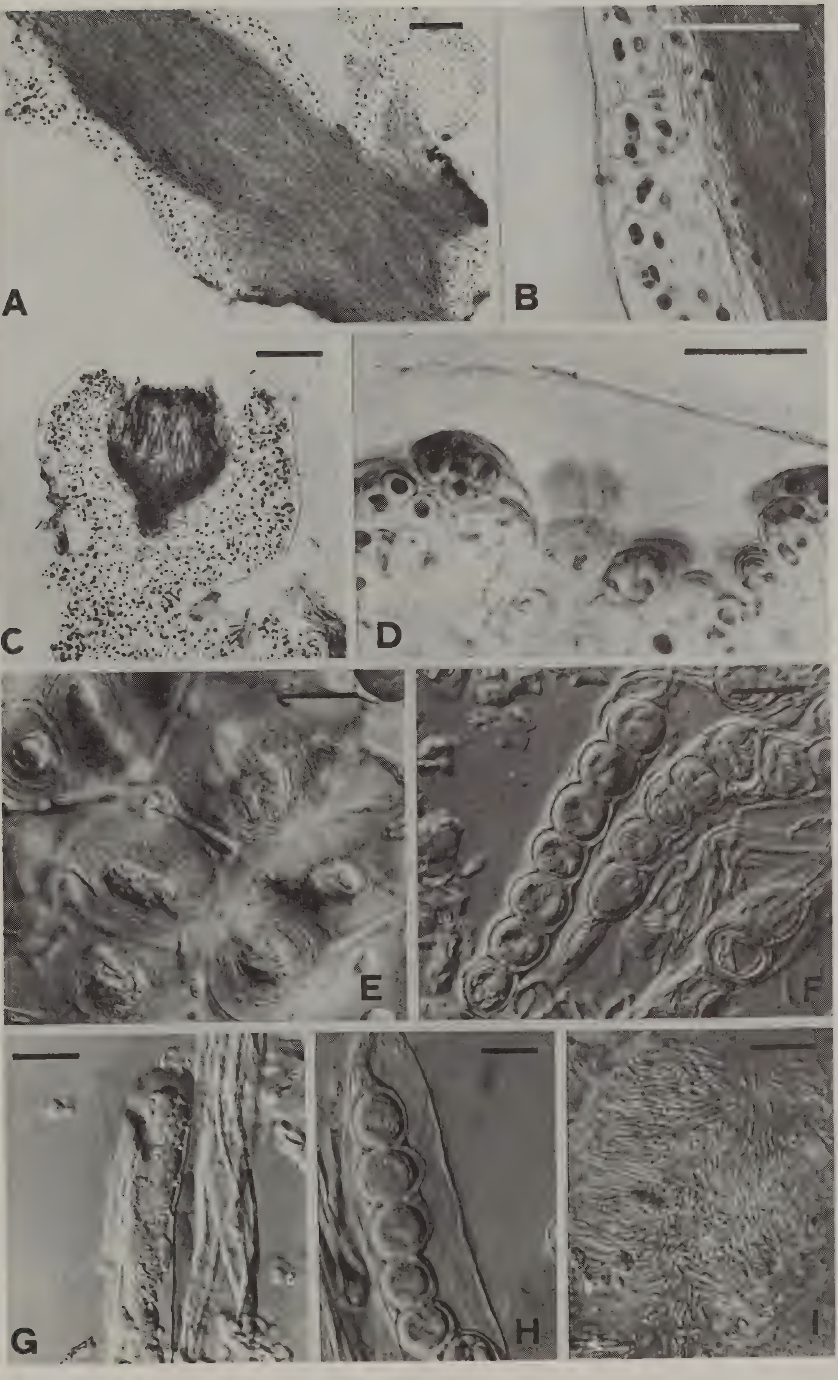


Fig. 1 - Habit photographs of *Paulia* species. A-C, *P. caespitosa*, holotypus: A, upper view of a young thallus; B, lateral view of the same thallus; C, upper view of an old, irregular thallus; D, *P. caespitosa*, isotype hb. Henssen: clustered, terete lobules. E, *P. glomerata*, hb. Henssen RN 92/22: glomerate thallus in surface view. F: *P. japonica*, holotypus: fruticulose thallus in surface view. G: *P. caespitosa*, isotype TSB 19998: tips of lobules with immersed apothecia and pycnidia (arrows). Scale bars A-F 1 mm; G 0.3 mm.

common on calcareous substrata from *c.* 200 to 1600 m, in gorges with a humid topoclimate. This species corresponds in some characters to *P. caespitosa*. Both species have a non-amyloid hymenium and a similar spore size, c. 13-17 x 11-15 µm in *P. glomerata*, and 11-16 x 9-14 µm in *P. caespitosa*. However, the thalli of *P. glomerata* are formed either by compact glomerules connected by whitish rhizoidal strands (Fig. 1 E), or by imbricate, flattened lobules, both of which are attached to the substratum by an umbilicus or by several rhizoidal strands. The thalli of this species are often rather thick, and never minutely divided into clustered, terete lobules as occurs in *P. caespitosa*. In *P. glomerata* the apothecia are very rare, and often degenerated, and the asci usually contain a reduced number of spores. The latter species is dispersed by means of "naked" soredia (Henssen & Tretiach 1995) produced on the external surface of the thallus. Sometimes, these vegetative propagules start to grow on the rhizoidal strand itself, forming new lobules at the base of the thallus. Naked soredia were observed occasionally also in *P. caespitosa*. *Paulia japonica* is known only from the Japanese archipelago (Asahina 1958, Henssen 1986). This species has a fruticulose thallus, 8-15 mm broad, that is more or less divided into narrow, branched, convex lobes with an uneven surface (Fig. 1 F). The lobes are discrete or imbricate, and covered by numerous, immersed apothecia. The hymenium of *P. japonica* is non-amyloid, as occurs in *P. caespitosa*, and the spores are elongated, measuring 18-21.5 x 11-14 µm.

When compared to vertical sections of peltate *Paulia* species, *P. caespitosa* is only morphologically similar to *P. gibbosa,* a Caribbean species with a regularly tessellate thallus formed by aggregated outgrowths and long stipitate apothecia (Henssen 1986). In *P. caespitosa*, however, the clustered lobules are evidently cylindrical and branched, and the vertical growth is more irregular. A further difference is the reaction of the hymenium to iodine, that is positive in *P. gibbosa*, and negative in *P. caespitosa*.

Fig. 2 - Anatomy of *Paulia caespitosa* (holotypus): A, base of rhizoidal strand; B, layer of tissue covering the strand formed by thick-walled hyphae; C, young apothecium; D, hyaline layer on the surface of a lobule; E, cells of the cyanobionts with the zonate, gelatinous sheath filled by particles; F, eight-spored ascus; G, young ascus with gelatinous outer layer; H, thick-walled spores; I, conidia. A-D: microtome sections in LPCB; E-I: squashes by DIC. Scale bars A, B 100 µm; C 150 µm; D 50 µm; E-H 10 µm; I 20 µm.


A
B
C
D
E
F
G
H
I

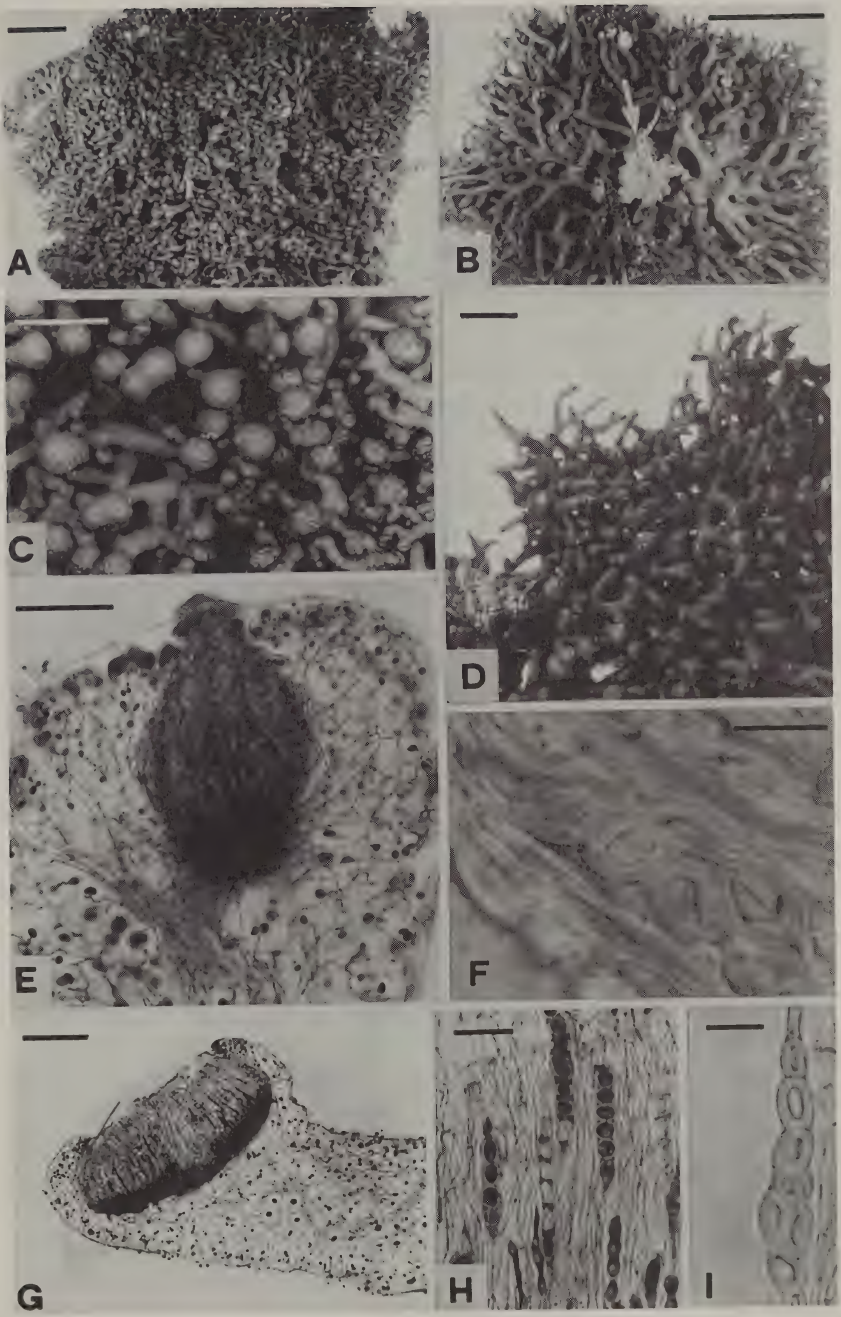
Paulia wrightii (Tuck.) Tretiach & Henssen **comb. nov.**

Basyon.: *Omphalaria wrightii* Tuck. Gen. Lich.: 72 (1872). Syn.: *Synalissa wrightii* (Tuck.) Nyl., Flora 59: 558 (1876). - *Peccania wrightii* (Tuck.) Forssell, Nova Acta Reg. Soc. Sci. Upsal., ser. 3, 13 (6): 90 (1885). - *Lempholemma wrightii* (Tuck.) Henssen, Lichenologist 4: 103 (1969).
Type collection: on rocks, Guajuybon, May 8, in ins. Cuba, C. Wright of 1868, N. ser. 2, 46, hb Tuckerman, FH! (*holotypus*); H - Nyl 42697!, FH ex Herb. Willey!, S! (*isotypi*).

(Fig. 3)

Thallus fruticose, orbicular, a few millimeters tall, up to 25 mm in diam. (Fig. 3 A), composed of dichotomously branched lobules attached to the substratum by a compact, white umbilicus formed by thickened hyphae (Fig. 3 B). Lobules cylindrical (Fig. 3 D), 0.15-0.25 mm in section, clavate at their tip when bearing an immersed apothecium (Fig. 3 C). Surface of the lobules smooth and glossy, covered by a thick, gelatinous layer penetrated by thin hyphae. Hyphae of the lobules less than 1 mm wide, forming a mesh around the cells of the cyanobiont, penetrated by haustoria. Cyanobiont probably a member of Chroococcales, cells singly, small, up to 15-25 x 10-20 µm, with a thick gelatinous sheath more or less zonate, often with deposited particles. Apothecia numerous, immersed, terminal or subterminal, to 0.6 mm wide, with a pale brown disc, flat or slightly depressed and circular in shape. Hymenium non-amyloid, subhymenium well-developed, formed by a hyphal network staining strongly blue in LPCB (Fig. 3 G). Paraphyses branched and anastomosing, 1-1.5 mm thick (Fig. 3 H). Asci cylindrical, regularly 8-spored, 90-125 x 15-20 µm, wall appressed to the spores, I- (Fig. 3 I). Ascospores uniseriate, simple, colorless, sphaerical or broadly ellipsoid, (15-) 17-20 (-25) x 10-15 µm, with a two-layered wall, 4-6 µm thick (Fig. 3 F). Pycnidia immersed, conidia bacilliform, 1 x 2 µm.

Fig. 3 - *Paulia wrightii* (A-C and F-I, holotypus; D-E, isotypus H-Nyl). A, fruticose thallus in surface view; B, branched lobules and umbilicus (arrow); C, terminal, immersed apothecia; D, tips of the peripheral lobules; E, cone-shaped primordium of apothecium; F, thick-walled ascospores; G, cross-section of a mature apothecium; H, hymenium; I, eight-spored ascus. Scale bars A, B 2.5 mm; C, D 1 mm; E 80 µm; F, I 20 µm; G 125 µm; H 50 µm.


A
B
C
D
E
F
G
H
I

DISTRIBUTION - The species was only known from the type locality of Gaujuybon, the "os coggygria of the island (Western Cuba)" (Wright, *in litt.*). However, in FH two specimens of *P. wrightii* collected in Jamaica (without further indications of locality), are also preserved; they presumably come from the herb. Hasse because the labels are obviously written by his hand. The material is morphologically identical with the original collection.

SYSTEMATIC REMARKS - Tuckerman (1872) in his comments to the newly described *Omphalaria wrightii*, stressed the very peculiar habit of this lichen, "perhaps the most elegant, fruticulose Collemeine lichen known as yet to science". This peculiarity is obvious by the different interpretations of its systematic position given by subsequent authors. A few years later the species was transferred to *Synalissa* by Nylander (1876), who noted, however, the deviating greenish color of the species. Forssell (1885) placed it in *Peccania*, although he was aware that its conidia were short, and not filiform as in typical *Peccania* species (Forssell 1885, p. 88). More recently, Henssen (1969) placed the species in the genus *Lempholemma* on account of its fruticose thallus, resembling that of *L. fennicum*. The external morphology of *O. wrightii* recalls also *Lichina* species, but thallus structure and apothecial development are clearly those of the genus *Paulia*. By the true fruticose habit, *P. wrightii* occupies a rather isolated position within the genus. The limited fruticulose growth-forms of *P. glomerata*, *P. japonica*, and *P. caespitosa* might be interpreted as modifications of an either lobate (*P. glomerata*, *P. japonica*) or tessellate rosette-shaped thallus (*P. caespitosa*). In our opinion however, the deviating habit of *P. wrightii* is not sufficient to establish a new monotypic genus.

Conclusion

The inclusion of a further fruticulose (*Paulia caespitosa*), and a true fruticose species (*P. wrightii*) reveals an unexpected large morphological diversity of the genus *Paulia*. However, all the species of this genus are well characterized by the following anatomical characters: eight-spored asci, with uniseriate, thick-walled spores, primordium of apothecia cone-shaped, intensively staining in LPCB, and strongly gelatinous thalli, with a thin hyphal network, the meshes surrounding the single cells of the cyanobiont.

Acknowledgements

We are grateful to the Curators of the Herbaria cited in this work for their cooperation, and to Prof. W.A. Weber (University of Colorado) for the informations on the ecology of the new species, and for his generous hospitality to one of us (M.T.) during his visit to the Herbarium of the University of Colorado. M.T. thanks Prof. T.H. Nash III (Arizona State University) who offered him a post-doc grant to study the *Lichinaceae* of the Sonora Desert, and Dr. R. Robertson (Arizona State University) who permitted the use of his microscopes. The study of M.T. has been supported by MURST funds, responsible Prof. P.L. Nimis (University of Trieste), and by National Science Foundation grant BSR 9201111, responsible Prof. T.H. Nash III. Financial support has been received by A.H. from the Deutsche Forschunggemeinschaft.

References

Asahina Y., 1958. Lichenologische Notizen (§ 140-142). J. Jap. Bot. 33: 129-133.

Forssell K.B.J., 1885. Beiträge zur Kenntnis der Anatomie und Systematik der Gloeolichenen. Nova Acta Reg. Soc. Sci. Upsal., ser. 3, 13 (6): 1-118.

Henssen A., 1969. An interesting new species of *Lempholemma* from Canada. Lichenologist 4: 99-104.

Henssen A., 1986. The genus *Paulia (Lichinaceae*). Lichenologist 18: 201-229.

Henssen A. & P.M. Jørgensen, 1990. New combinations and synonyms in the *Lichinaceae*. Lichenologist 22: 137-147.

Henssen A. & M. Tretiach, 1995. *Paulia glomerata,* a new epilithic lichen species from Europe, and additional notes on other *Paulia* species. Nova Hedwigia, in press.

Massalongo A., 1856. De nonnullis Collemaceis ex tribu *Omphalariearum* brevis commentatio. Flora 14: 209-215.

Nylander W., 1876. Collemacei, Caliciei, Cladoniei et Thelotremei Cubani novi. Flora 59: 558-562.

Tuckerman E., 1872. Genera lichenum: an arrangement of the North American lichens. E. Nelson, Amherst, 283 pp.

MYCOTAXON

Volume LVII, pp. 371-390 January-March 1996

SPECIES OF ASCOMYCOTA FORMING ECTOMYCORRHIZAE

LEONOR C. MAIA[1], ADRIANA M. YANO[1] and JAMES W. KIMBROUGH[2]

[1]Departamento de Micologia, Universidade Federal
de Pernambuco. 50670-420 Recife, PE, Brasil.
[2]Plant Pathology Department, University of Florida.
Gainesville, FL, 32611 USA.

ABSTRACT

A current list of ectomycorrhizae-forming Ascomycota and their respective hosts is provided. Three orders, Elaphomycetales, Leotiales and Pezizales, are represented by 14 families containing 42 genera (two anamorphs) and more than 100 species. References on Ascomycota and host species suspected of being in mycorrhizal association are also presented.

Key words: ectomycorrhiza, Ascomycota, Leotiales, Pezizales, Elaphomycetales.

INTRODUCTION

More than 100 years have passed since the first reports about the association between fungi and roots of vascular plants were published. At the beginning of these studies the nature of the association was not well defined, and the phenomenon was misunderstood. Trappe (1971a) reports that Tulasne & Tulasne (1841) considered the association between *Elaphomyces* and roots of vascular plants as parasitic, while Vittadini (1831) concluded that this association was beneficial to the host.

In his classic work, Frank (1885) was the first to describe the relationship between hyphal fungi and roots as "Mykorrhizen", since the fungi formed a mantle surrounding the root. In 1887, Frank applied the term "ectotrophic" to better describe the association. The work of Melin (1923, 1925) confirmed the symbiotic character of mycorrhizae.

Currently, the mycorrhizal habit is known to be widespread on a great variety of plant species. As pointed out by Marks & Foster (1973), "mycorrhizal formation appears to be the rule rather than the exception among forest trees."

Different groups of mycorrhizae have been distinguished, according to their morphological characters. Ectomycorrhizae are recognized by the presence of a fungal mantle which encloses the rootlet, while the mycelium penetrates the cortex, forming an intercellular system known as the Hartig net around the cortical cells (Harley & Smith, 1983). Formed almost exclusively by the fungal partner, this structure has a characteristic color, form, and arrangement, although among different genera variations in external appearance and internal cell arrangement have been observed (Zak, 1973).

Considering the characteristic features of an ectomycorrhiza, it is easy to understand why it was the first kind of mycorrhiza to be observed and described. Trappe (1971a) indicated that the first group of ectomycorrhizal fungi studied were Ascomycota. Thus, the only species mentioned by Frank (1885) when he coined the term mycorrhiza was *Tuber aestivum* Vittad., and the first papers with detailed drawings of roots showing the anatomical relationship between hosts and certain fungi were those with *Elaphomyces* spp. (Trappe, 1971a; Agerer, 1986). Although mycorrhiza-forming Ascomycota have been known since that time, much research is needed in order to determine the highest possible number of fungi and vascular plants forming mycorrhizal relationships. Many general papers about ectomycorrhizae have been published relating to structural, morphological, physiological, genetic, taxonomic, and ecological aspects (Marks & Kozlowski, 1973; Cooke, 1977; Marks & Krupa, 1978; Mikola, 1980; Schenck, 1982; Harley & Smith, 1983; Agerer, 1986). Data about fungal species and associated vascular plants were published by Trappe (1962, 1964, 1971a) more than twenty years ago. Harley & Harley (1987) presented a check-list of mycorrhizae in the British flora but they mentioned only the plant species. Recent data should be summarized since many new additions have been made.

The objective of this paper is to provide an up-to-date list of ectomycorrhiza-forming Ascomycota and their respective hosts along with a list of suspected but unconfirmed associations.

Ascomycota have established symbiotic relationships with a wide variety of photosynthetic plants. This paper, however, will not include ectendomycorrhizae, ericoid mycorrhizae, or endophytes of ferns, mosses, and other plants.

Throughout this paper authors of fungal names are spelled following Kirk & Ansell (1992); author citations were simplified based on the International Code of Botanical Nomenclature.

TAXA OF MYCORRHIZAL ASCOMYCOTA

Species of ectomycorrhizal Ascomycota in general share some characters which identify their symbiotic condition. Their ascomata can be found near mycorrhizal vascular plants which do not have any sign of disease, a sheath is present on the root system and a Hartig net is formed by hyphae with characteristic ascomycete pores (Kope & Warcup, 1986). Moreover, the fungal species isolated from mycorrhizal roots do not grow easily in culture (Trappe, 1971a).

Species which fit these characteristics have been classified in three orders: Elaphomycetales, Leotiales, and Pezizales (including Tuberales).

ELAPHOMYCETALES

This order has a single family and one genus: *Elaphomyces*. It is characterized by formation of globose asci, distributed randomly through the ascoma. There is no hymenium. Trappe (1971a) suggested that probably all species of *Elaphomyces* are ectomycorrhizal. The genus has been known to be symbiotic with roots since the earliest mycorrhizal studies. Along with *Cenococcum* (anamorph of *Elaphomyces anthracinus*), it can be considered one of the most widespread ectomycorrhizal genera based on its host range.

LEOTIALES

The Leotiales (≡ Helotiales, after Carpenter, 1988) are represented by 11 families, 350 genera and 2000 species (Kendrick, 1992), few of which are mentioned as forming ectomycorrhiza.

These fungi are epigean Discomycetes characterized by having inoperculate asci, usually with an apical pore, in apothecia of varying morphology not formed within a stroma.

PEZIZALES

This order of Discomycetes has 150 genera and 900 species (Kendrick, 1992) and includes a wide variety of fungi. The members of this order have cylindrical to clavate asci and paraphyses arranged in a distinct hymenium. In some families the ascus has an apical or subapical operculum through which the unicellular ascospores are violently discharged. In families such as Geneaceae and Tuberaceae, where the species form hypogeous ascomata, the spores are not forcibly liberated. These species have persistent asci but without a mechanism for forcible spore discharge (Trappe, 1971a). Due to their particular habit, they have developed different methods for passive spore dispersal such as a characteristic smell of some ascomata that attracts animals, especially mammals. For many small rodents, hypogeous, ectomycorrhizal fungi have been shown to be a vital part of their survival and distribution (Maser et al., 1978).

Genera representing eight families of Pezizales are known to be associated with vascular plant roots forming ectomycorrhiza. Among these genera, *Tuber* has the highest number of associated hosts.

The position of families and genera cited in the list is based on those outlined by Trappe (1979) and Eriksson & Hawksworth (1987). References are provided for all mycorrhizal associations. A number of mycorrhizal-host relationships have been proposed but not confirmed. They are indicated by an asterisk (*).

ELAPHOMYCETALES
ELAPHOMYCETACEAE

Regarding the genus *Cenococcum*, anamorph of *Elaphomyces anthracinus*, only the references to new additions after Trappe (1962, 1964) are cited since an extensive list of mycorrhizal hosts associated with *Cenococcum* was already presented there.

FUNGUS, HOST, and REFERENCE

Cenococcum geophilum Fr.

Alnus crispa - Godbout & Fortin, 1983; _A. rubra_ - Brunner et al., 1990; _A. rugosa_ - Godbout & Fortin,1983; _Betula pendula_ - Newton 1991; Newton & Pigott, 1991a, 1991b; _Castanopsis fissa_ - Tam & Griffiths, 1993a; _Dryas integrifolia_ - Bledsoe et al., 1990; _Eucalyptus delegatensis_, _E. obliqua_, and _E. regnans_ - Warcup, 1991; _Hemitomes congestum_* - Castellano & Trappe, 1985; _Larix laricina_ - Samson & Fortin, 1986; Zhu & Navratil, 1987; _L. occidentalis_ - Molina & Trappe, 1982; _Picea mariana_ - Samson & Fortin, 1986; _P. sitchensis_ - Molina & Trappe, 1982; _Pinus contorta_ - Danielson & Visser, 1989; Molina & Trappe, 1982; _P. monticola_ and _P. ponderosa_ - Molina & Trappe, 1982; _P. radiata_ - Garrido, 1986; _P. sylvestris_ - Termorshuizen & Schaffers, 1991; _P. virginiana_ - Kroehler et al., 1988; _Pleuricospora fimbriolata_* - Castellano & Trappe, 1985; _Potentilla hyperactiva_ - Bledsoe et al., 1990; _Pseudotsuga menziesii_ - Molina & Trappe, 1982; _Pterospora andromedea_* - Castellano & Trappe, 1985; _Quercus alba_ - Dixon et al., 1993; _Q. myrsinaefolia_ - Tam & Griffiths, 1993a; 1993b; _Q. robur_ - Newton, 1991; Newton & Pigott, 1991a, 1991b; _Salix artica_ - Bledsoe et al., 1990; _S. rotundifolia_ - Kroehler et al., 1988; _Tilia cordata_ - Pigott, 1982; _Tristania obovata_ -Alexander & Hogberg, 1986; _Tsuga canadensis_ - Trappe, 1962; Kropp & Trappe, 1982; _T. heterophylla_ -Trappe, 1962; Kropp & Trappe, 1982; Christy et al., 1982; Molina & Trappe, 1982; _T. mertensiana_ - Massicotte et al., 1992.

Cenococcum geophilum Fr. (as **_Cenococcum graniforme_** (Sow.) Ferd. & Winge

Abies alba - Berndt et al., 1990; _A. religiosa_ - Trappe & Salinas Quinard, 1966; _Pinus caribaea_* - Elwebelam, 1980; _P. caribaea_ var. _hondurensis_ Kasuya et al., 1990; _P. oocarpa_* - Ekwebelam, 1980; _Quercus petrea_ - Danielson & Pruden, 1989.

Cenococcum spp.

Helianthemum sp. - Harley & Smith, 1983; _Pinus sylvestris_ - Erland & Soderstrom, 1990.

Elaphomyces anthracinus Vittad.

Betula sp. - Eckblad, 1962; _Fagus sylvatica_ - Eckblad, 1962; _Quercus ilex_ - Alvarez et al., 1993; _Q. ilex_ subsp. _ballota_* - Moreno et al., 1991.

Elaphomyces asperulus Vittad.

Abies amabilis, _A. procera_ - Trappe, 1971a; _Betula_ spp., _Picea abies_, _Pinus sylvestris_ - Eckblad, 1962; _Pseudotsuga menziesii_ - Trappe, 1971a; _Quercus_ spp. - Eckblad, 1962.

Elaphomyces granulatus Fr. (= **_E. cervinus_**)

Abies amabilis, _A. procera_ - Trappe, 1971a; _Alnus_ spp., _Betula_ spp.; _Fagus sylvatica_ - Eckblad, 1962; Boulard & Dominik, 1966; Alvarez et al., 1993; _Juniperus communis_ - Eckblad, 1962; _Picea abies_ - Dominik & Packlewski, 1956; Eckblad, 1962; _P. engelmannii_ - Fogel & Trappe, 1976; _Pinus_ spp. - Khokhryakov, 1956; _P. banksiana_* - Danielson, 1979; _P. contorta_ - Fogel & Trappe, 1976; _P._

monticola - Trappe, 1971a; *P. ponderosa* - States, 1983; *P. radiata* - Garrido, 1986; *P. sylvestris* - Reess, 1885; Pachlewski, 1967; Alvarez et al., 1993; *Quercus* sp. - Alvarez et al., 1993; *Tsuga canadensis* - Kropp & Trappe, 1982; *T. diversifolia* - Trappe, 1976; *T. heterophylla* - Trappe, 1971a; *T. mertensiana* - Kropp & Trappe, 1982.

Elaphomyces guangdongensis B. C. Zhang

Castanopsis sp. - Zhang, 1991

Elaphomyces leveillei Tul.

Corylus cornuta - Eckblad, 1962

Elaphomyces morretti Vittad.

Tsuga canadensis - Kropp & Trappe,1982

Elaphomyces muricatus Fr.

Abies amabilis - Trappe, 1971a; *Alnus* spp. and *Betula* spp. - Eckblad, 1962; *Castanea sativa* and *Fagus sylvatica* - Fontana & Centrella, 1967; *Juniperus communis* - Eckblad, 1962; *Monotropha hypopitys* - Castellano & Trappe, 1985; *Picea abies* -Eckblad, 1962; *Pinus sylvestris* - Eckblad, 1962; Miller & Miller, 1984; *Pleuriscopora fimbriolata* - Castellano & Trappe, 1985; *Quercus pyrenaica* - Alvarez et al., 1993; *Tsuga heterophylla* and *T. mertensiana* - Kropp & Trappe, 1982.

Elaphomyces mutabilis Vittad.

Abies firma, *Castanopsis chinensis*, *Lithocarpus* sp., and *Pinus massoniana* - Zhang, 1991.

Elaphomyces miyabeanus S. Imai

Ulmus japonica - Imai, 1929

Elaphomyces nopporensis S. Imai

Ulmus japonica - Imai, 1929

Elaphomyces persoonii Vittad.

Castanea sativa - Alvarez et al., 1993

Elaphomyces reticulatus Vittad.

Corylus cornuta - Eckblad, 1962; *Pinus ponderosa* - Fogel & Trappe, 1976.

Elaphomyces trappei R. Galán & G. Moreno

Cistus ladanifer - Moreno et al., 1991; Alvarez et al., 1993

Elaphomyces subviscidus (Zeller) Trappe & Guzmán

Pinus ponderosa - Fogel & Trappe, 1976

Elaphomyces variegatus Vittad.

Picea sitchensis - Trappe, 1971a; *Pinus sylvestris* - Reess & Fisch, 1887; Lewton-Brain, 1901; *Tsuga heterophylla* - Trappe, 1971a.

Elaphomyces verrucosus B. O. Dodge

Pinus ponderosa - States, 1983

Elaphomyces viridiseptum Trappe & Kimbr.

Host undefined - Trappe & Kimbrough, 1972

Elaphomyces sp.

Allocasuarina littoralis, *Casuarina equisetifolia*, *C. cunninghamiana*, and *Eucalyptus* sp. - Theodorou & Reddell, 1991

LEOTIALES

GEOGLOSSACEAE

Cudonia circinans (Pers.) Fr.

Picea abies - Klinkova, 1954

Cudonia confusa Bres.

Picea abies - Klinkova, 1954

Spathularia flavida Pers.
Picea abies, *Pinus mugo*, *P. pence* - Klinkova, 1954

LEOTIACEAE
Neocudoniella radicella L. M. Kohn, Summerb. & Malloch
Picea spp.* - Kohn et al., 1986

PEZIZALES
ASCOBOLACEAE
Boudiera tracheia (Rehm ex Gamundí) Dissing & T. Schumacher
Melaleuca uncinata - Warcup, 1990.
Muciturbo reticulatus P. H. B. Talbot
Acacia sp., *Casuarina* sp., and *Eucalyptus maculata* - Warcup & Talbot, 1989; *E. obliqua* - Warcup & Talbot, 1989; Warcup, 1990; *Gompholobium* sp., *Melaleuca* sp., *Poranthera* sp., and *Pultanaea* sp. - Warcup & Talbot, 1989.
Muciturbo truncatus P. H. B. Talbot
Acacia sp. and *Eucalyptus* sp. - Warcup & Talbot, 1989.
Muciturbo verrucosus P. H. B. Talbot
Acacia sp. - Warcup & Talbot, 1989.

BALSAMIACEAE
Balsamia magnata Harkn.
Pinus ponderosa - States, 1983
Balsamia nigrens Harkn.
Pinus jeffreyi - Trappe, 1971a
Balsamia platyspora Berk. & Broome
Tilia sp. - Bussetti, 1962
Balsamia vulgaris Vittad.
Cistus albidus - Moreno et al., 1991; Alvarez et al., 1993; *Corylus avellana* - Alvarez et al., 1993; *Quercus* spp. - Mattirolo, 1932; *Tilia tomentosa* - Bussetti, 1962
Barssia oregonensis Gilkey
Alnus rubra and *Pseudotsuga menziesii* - Trappe, 1971a; *Tsuga heterophylla* - Kropp & Trappe, 1982.
Picoa carthusiana Tul.
Pseudotsuga menziesii - Trappe, 1971a; *Tsuga heterophylla* - Kropp & Trappe, 1982

GENEACEAE
Genea anthracnina Heblack & R. B. Stewart
*Pinus resinosa** - Stewart & Heblack, 1979
Genea gardneri Gilkey
Tsuga heterophylla - Kropp & Trappe, 1982
Genea harknessii Gilkey
Tsuga heterophylla - Kropp & Trappe, 1982
Genea klotzschii Berk. & Broome
Carpinus betulus - Fontana & Centrella, 1967; *Corylus avellana* and *Pinus pinea* - Alvarez et al., 1993; *Quercus petraea* and *Tilia* spp. - Fontana & Centrella, 1967
Genea verrucosa Vittad.
Carpinus betulus - Fontana & Centrella, 1967; *Cistus albidus* and *Quercus ilex* - Alvarez et al., 1993; *Q. ilex* subsp. *ballota** - Moreno et al., 1991
Genabea cerebriformis (Harkn.) Trappe (as ***Myrmecocystis cerebriformis*** Harkn.
Pseudotsuga menziesii - Trappe, 1971a

HELVELLACEAE

Fischerula subcaulis Trappe
_Abies procera_* and _Pseudotesuga menziesii_* - Trappe, 1975

Gyromitra esculenta (Pers.) Fr.
Pinus sylvestris - Peyronel, 1929; _Pinus_ sp. - Orlos, 1961; _Populus tremula_ - Ulbrich, 1936

Gyromitra infula (Schaeff.) Quél.
Picea abies - Ulbrich, 1936; Klinkova, 1954

Gyromitra sichuanensis Korf & W. Y. Zhuang
_Picea sichuanensis_* and _Quercus pannosa_* - Korf & Zhuang, 1985

Helvella corium (O. Weberb.) Massee
Salix sp. - Laursen & Chmielewski, 1980

Helvella crispa Scop.
Fagus sylvatica - Ulbrich, 1936

Hydnotrya cerebriformis Harkn.
Abies lasiocarpa - Fogel & Trappe, 1976

Hydnotrya cubispora (E. A. Bessey & B. E. Thomps.) Gilkey
Abies lasiocarpa - Trappe, 1971a

Hydnotrya michaelis (E. Fisch.) Trappe
Picea engelmannii - Fogel & Trappe, 1976; _Tsuga mertensiana_ - Trappe, 1971a.

Hydnotrya tulasnei (Berk.) Berk. & Broome
Corylus avellana and _Fagus sylvatica_ - Alvarez et al., 1993; _Larix decidua_ - Peyronel, 1929; _Pinus_ spp. and _Quercus_ spp. - Alvarez et al., 1993.

MORCHELLACEAE

Morchella rotunda (Pers.) Boud.
Picea abies - Buscot & Kottke, 1990

PEZIZACEAE

Amylascus herbertianus (Cribb) Trappe
Host undefined* - Trappe, 1971b

Hydnobolitis cerebriformis Tul. & C. Tul.
Host undefined - Trappe, 1971b; _Quercus virginiana_ - (Kimbrough, per. comm.)

Peziza badia Pers.
Betula sp. - Mason et al., 1982

Peziza lohjaensis Harmaja
_Populus tremula_* - Harmaja, 1986

Peziza whitei (Gilkey) Trappe
Angianthus tomentosus and _Eucalyptus maculata_ - Kope & Warcup,1986; _E. obliqua_ - Kope & Warcup, 1986; Warcup, 1990; _Gnephosis skirrophora_, _Lobelia heterophylla_, and _Podotheca gnaphalioides_ - Warcup, 1990; _P. mycrophylla_ and _Pultenaea obovata_ - Kope & Warcup, 1986; _Thysanotus_ sp. - McGee, 1988; _Waitzia citrina_ - Kope & Warcup,1986.

Plicaria alveolata (Rodway) Rifai
Melaleuca uncinata - Warcup, 1990

Tirmania nivea (Desf.) Trappe (= ***Tirmania africana*** Chatin)
Helianthemum ledifolium and _H. salicifolium_ - Awameh & Alsheikh, 1979; Trappe, 1992; _H. lippii_ - Rayss, 1959; Trappe et al., 1992; _H. sessiliflorum_, _Plantago_ and _Artemisia_ spp.* - Binyamini, 1980; Alsheikh & Trappe, 1983

Tirmania pinoyi (Maire) Malençon
Helianthemum ledifolium and _H. salicifolium_ - Awameh &

Alsheikh, 1979; Alsheikh & Trappe, 1983

Tirmania spp.

Cistus sp., *Helianthemum* sp., and *Tuberana* sp. - Harley & Smith, 1983; *Helianthemum* spp. - Awameh & Alsheikh, 1979; Alsheikh & Trappe, 1983

OTIDEACEAE

Complexipes *sp.* (anamorph of ***Wilcoxina***)

Picea glauca and *Picea pungens* - Danielson & Visser, 1989.

Geopora arenicola (Lév.) Kers (= ***Sepultaria arenicola*** (Lév.) Cooke)

Pinus spp. -Alvarez et al., 1993; *P. halepensis* - Moreno et al.,1991; Alvarez et al., 1993; *P. pinaster* - Alvarez et al., 1993

Geopora cervina (Velen.) T. Schumach

Quercus faginea and *Q. ilex* - Alvarez et al., 1993

Geopora clausa (Tul. & C. Tul.) Burdsall f. ***clausa***

_Populus balsamipra_* - Danielson, 1979

Geopora cooperi Harkn.

Abies grandis f. *cooperi* - Trappe, 1971a; *Juniperus* _oxycedrus_* - Moreno et al., 1991; *Picea engelmanii* - States, 1983; *Pinus spp.* - Alvarez et al., 1993; *P. contorta* - Fogel & Trappe, 1976; *P. ponderosa* - States, 1983; *Pseudotsuga menziesii* - Trappe, 1971a; *Quercus gambelli* - States, 1983; *Q. ilex* - Alvarez et al., 1993; *Q. ilex* subsp. _ballota_* - Moreno et al., 1991.

Geopora cooperi Harkn. f. ***gilkeyae*** Burdsall

Picea engelmannii and *Pinus contorta* - Fogel & Trappe, 1976; *P.ponderosa* and *Pseudotsuga menziesii*- States,1983

Geopora foliacea (Schaeff.) S. Ahmad (= ***Sepultaria foliacea*** (Schaeff.) Boud.)

Pinus halepensis and *Populus alba* - Alvarez et al., 1993

Geopora nicaensis (Boud.) M. Torre

Juniperus _thurifera_* - Moreno et al., 1991; *Quercus ilex* - Alvarez et al., 1993; *Q. ilex* subsp. _ballota_* - Moreno et al., 1991.

Geopora sumneriana (Cooke) M. Torre

Cedrus sp. - Heim, 1957; Alvarez et al., 1993; *C. atlantica* - Boulard, 1961; *C. libani* - Guinier, 1949

Lachnea vinosobrunnea (Berk. & Broome) Sacc.

Helipterum stipitatum (F. Muell.) ex. Benth. - Warcup, 1990; *Lobelia gracilis*, *L. heterophylla*, and *Melaleuca uncinata* - Warcup, 1990

Otidea indivisa Velen.

Picea abies - Klinkova, 1954

Trichophaea hazslinszkia (Cooke) Boud. (= ***Sarcoschypha harzsluszkia*** Cooke)

Dryas octopetala - Colla, 1931

Wilcoxina mikolae (Chin S. Yang & H. E. Wilcox) Chin S. Yang & Korf

Pinaceae - Yang & Korf, 1985; *Picea glauca*, *Pinus banksiana*, and *P. resinosa* - Egger et al., 1991

Wilcoxina mikolae var. ***mikolae*** (Chin S. Yang & H. E. Wilcox) Chin S. Yang & Korf

Betula alleghaniensis and *Picea mariana* - Scales & Peterson, 1991; *Pinus resinosa* - Egger et al., 1991

Wilcoxina mikolae* var. *tetraspora H. E. Wilcox, Chin S. Yang & Korf
    Pinus resinosa - Egger et al., 1991
Wilcoxina rehmii Chin S. Yang & Korf
    Picea glauca and *Pinus banksiana* - Egger et al., 1991

PYRONEMATACEAE (sensu Korf, 1972)
Dingleya geometrica Trappe, Castellano & Malajczuk
    *Eucalyptus grandis** - Trappe et al., 1992
Dingleya phymatodea (Zhang & Minter) Trappe, Castellano & Malajczuk
    Leptospermum sp.* - Zhang & Minter, 1988; Trappe et al., 1992
Dingleya tessellata (Beaton & Weste) Trappe, Castellano & Malajczuk
    Eucalyptus sp.* - Trappe et al., 1992
Hydnocystis sp.
    Cistus sp., *Helianthemun* sp., and *Tuberana* sp. - Harley & Smith, 1983
Labyrinthomyces donkii Malençon
    Eucalyptus globulus - Alvarez et al., 1993
Labyrinthomyces varius (Rodway) Trappe
    Eucalyptus obliqua - Warcup, 1990; *Allocasuarina littoralis**, *Eucalyptus diversicolor**, *E. globulus**, *E. grandis**, *E. jacksonii**, *E. pilularis**, *E. saligna**, *E. tereticornis**, and *E. torelliana** - Trappe et al., 1992
Nothojafnea cryptotricha Rifai
    Melaleuca uncinata - Warcup, 1990.
Phaeangium lefebvrei Pat.
    Helianthemum spp.* - Awameh & Alsheikh, 1979; Alsheikh & Trappe, 1983.
Pseudaleuria quinaultiana Lusk
    Pinus ponderosa and *Pseudotsuga menziesii* - Lusk, 1987.
Pulvinula tetraspora (Hansf.) Rifai
    Melaleuca uncinata - Warcup, 1990.
Reddellomyces donkii (Malençon) Trappe, Castellano & Malajczuk
    Eucalyptus spp., *Acacia* spp.* and *Olea* spp.* - Malençon, 1973; Trappe et al., 1992
Reddellomyces magnisporus Trappe, Caltellano & Malajczuk
    *Eucalyptus sargentii** and *Casuarina* sp.* - Trappe et al., 1992
Reddellomyces parvulosporus (Beaton & Malajczuk) Trappe, Castellano & Malajczuk
    *Melaleuca lanceolata** and *Eucalyptus sargentii** - Beaton & Malajczuk, 1986; Trappe et al., 1992
Reddellomyces westraliensis (Beaton & Malajczuk) Trappe, Castellano & Malajczuk
    *Acacia iteaphylla**, *Allocasuarina* sp.*, *Eucalyptus gomphocephala** and *E. marginata** - Beaton & Malajczuk, 1986; Trappe et al., 1992;
as ***Labyrinthomyces*** sp.
    Angianthus tomentosum, *Eucalyptus maculata*, *Poranthera microphylla*, *Pultenaea obovata*, and *Stylidium graminifolium* - Kope & Warcup, 1986 after Trappe et al., 1992.
Sphaerosporella brunnea (Alb. & Schwein) Svrcek & Kubicka
    Larix laricina, *L. occidentalis*, *Picea glauca*, *P. mariana*

P. contorta var. *latifolia*, *P. flexilis*, *P. ponderosa*, and *Populus tremuloides* - Danielson, 1984.

SARCOSCYPHACEAE

Sarcosoma globosum (Schmidel) Casp.

Picea abies - Parmasto, 1958

TERFEZIACEAE

Choiromyces magnusii (Mattir.) Paol.

Cistus ladanifer - Moreno et al., 1991

Choiromyces venosus (Fr.) Th. Fr. (= ***C. meandriformis*** Vittad.)

Betula spp. - Khokhryakov, 1956; *Cistus ladanifer* - Alvarez et al., 1993; *Carpinus betulus* - Fontana & Centrella, 1967; *Fagus* sp. - Alvarez et al., 1993; *F. sylvatica* - Fontana & Centrella, 1967; *Picea abies* and *Pinus sylvestris* - Tichomirow, 1896; *Pinus* spp. - Khokhryakov, 1956; *Populus tremula* - Tichomirow, 1896; *Quercus* sp. - Alvarez et al., 1993.

Terfezia arenaria (Moris) Trappe (= *T. leonis* Tul.)

Cistus ladanifer, *C. monspeliensis*, *C. alvifolius*, and *Helianthemum guttatum* - Alvarez et al., 1993; *H. sessiflorum* - Rayss, 1959.

Terfezia claveryi Chatin

Cistus salviaefolius - Tichomirow, 1896; *Helianthemum salicifolium* - Alvarez et al., 1993.

Terfezia gigantea S. Imai

Host undefined* - Trappe & Sundberg, 1977

Terfezia hispanica Lázaro Ibiza

Helianthemum paniculatum, *H. salicifolium*, *H. vulgaris*, and *Tuberaria variabilis* - Alvarez et al., 1993

Terfezia olbiensis (Tul. & C. Tul.) Tul. & C. Tul. (= *T. leptoderma* Tul. & C. Tul.)

Cistus albidus and *C. salviaefolius* - Le Duc et al., 1986; *Helianthemum guttatum* and *H. paniculatum* - Alvarez et al., 1993; *Helianthum salicifolium* - Le Duc et al., 1986; *Quercus ilex* and *Tuberaria variabilis* - Alvarez et al., 1993.

Terfezia sp.

Cistus sp., *Helianthemum* sp., and *Tuberana* sp. - Harley & Smith,1983.

TUBERACEAE

Tuber aestivum Vittad.

Fagus sylvatica - Frank, 1885; Lubelska, 1953; *Cistus incanus* - Giovanetti & Fontana, 1982; *Corylus avellana* - Palenzona, 1969; Alvarez et al., 1993; *Pinus* sp. and *Quercus ilex* - Alvarez et al., 1993; *Q. ilex* subsp. *ballota** - Moreno et al., 1991; *Quercus* spp. - Mattirolo, 1933; Khokhryakov, 1956.

Tuber albidum Pico

Pinus pinea - Pasqualine et al., 1992; *P. strobus* - Scannerini & Palenzona, 1967; Fontana & Palenzona, 1969.

Tuber asa Tul. & C. Tul.

Cistus ladanifer - Moreno et al., 1991; Alvarez et al., 1993

Tuber borchii Vittad. (= *T. albidum* Pico)

Cistus incanus ssp. *incanus* - Giovanetti & Fontana, 1982; *Corylus avellana* - Fontana & Centrella, 1967; *Fagus sylvatica* and *L. decidua* - Ceruti, 1965; *Pinus halepensis* - Alvarez et al., 1993; *P. pinea* - Ceruti, 1965; Fontana & Centrella, 1967; *Pinus pinaster* - Ceruti, 1965; *P. strobus* - Scannerini & Palenzona, 1967; *P. sylvestris* - Ceruti, 1965; *Pinus* spp. - Mattirolo, 1933; *Populus canadensis* - Trappe, 1962; *P. deltoides* x *nigra* - Mattirolo, 1934; *Populus* spp. - Ceruti, 1965; *Quercus petraea* - Fontana & Centrella, 1967.

Tuber brumale Vittad.

Corylus avellana - Palenzona, 1969; Alvarez et al., 1993; *Quercus* spp. - Khokhryakov, 1956; Alvarez et al., 1993; *Tilia* sp. - Fontana & Centrella, 1967.

Tuber californicum Harkn.

Cistus incanus ssp. *incanus* - Giovanetti & Fontana, 1982; *Pseudotsuga menziesii* - Trappe, 1971a.

Tuber dryophilum Tul.

Pinus ponderosa and *Quercus gambelli* - States, 1983.

Tuber excavatum Vittad.

Corylus avellana - Alvarez et al., 1993; *Fagus sylvatica* - Hawker, 1954; *Pinus* sp., *Populus* sp., and *Quercus ilex* - Alvarez et al., 1993; *Q. ilex* subsp. *ballota** - Moreno et al., 1991.

Tuber foetidum Vittad.

Pinus sp. - Alvarez et al., 1993

Tuber gibbosum Harkn.

Pseudotsuga menziesii - Trappe, 1971a

Tuber griseum Pers.

Abies alba - Mattirolo, 1910, 1932; *Alnus* spp., *Carpinus betulus, Castanea sativa*, and *Cedrus* sp. - Mattirolo, 1910; *Corylus avellana* - Mattirolo, 1910; Ceruti,1965; *Juniperus* spp. - Mattirolo, 1910, 1932; *Ostrya* spp. and *Pinus* spp. - Mattirolo, 1910; *Populus* spp. - Mattirolo, 1910, 1932; *P. alba* - Tichomirow, 1896; *Ceruti*, 1968; *P. fastigiata* - Tichomirow, 1896; *P. nigra* - Tichomirow, 1896; Ceruti, 1965, 1968; *P. pyramidalis, Quercus petraea, Q. pubescens*, and *Q. robur* - Ceruti, 1968; *Quercus* spp. - Mattirolo, 1932; *Salix alba* - Mattirolo, 1910; Ceruti, 1968; *Salix* spp. - Mattirolo, 1910; 1932; *Tilia europaea* - Ceruti, 1965; *Tilia* spp. - Ceruti, 1968

Tuber hiromichii (S. Imai) Trappe

Acer palmatum, Populus deltoides x *nigra*, and *P. nigra* - Trappe, 1971b.

Tuber levissimum Gilkey

Pseudotsuga menziesii - Fontana & Centrella, 1967; Alvarez et al., 1993.

Tuber macrosporum Vittad.

Corylus avellana, Quercus pedunculata, and *Q. pubescens* - Giovanetti & Fontana, 1981.

Tuber maculatum Vittad.

Pinus strobus - Fassi & Fontana, 1967; Ceruti, 1968; *P. menziesii* - Alvarez et al., 1993.

Tuber magnatum Pico

Quercus robur - Trappe, 1962

Tuber melanosporum Vittad.

Abies spp. - Mattirolo, 1910; *Alnus glutinosa* - Ceruti, 1968; *Betula pendula* - Tichomirow, 1896; *Carpinus betulus* - Tichomirow, 1896; Ceruti, 1965, 1968; *Castanea* *sativa* - Tichomirow, 1896; Ceruti, 1965; Alvarez et al., 1993; *Castanea* spp. - Trappe, 1962; *Cedrus* spp. - Mattirolo, 1910; *Cistus incanus* - Harley & Smith, 1983; *C. albidus, C. crispus, C. laurifolius, C. monspeliensis* and *C. salviaefolius* - Giovanetti & Fontana, 1982; *Corylus avellana* - Tichomirow, 1896; Ceruti, 1965, 1968; Palenzona, 1969; Pargney, 1990; Mamoun & Olivier, 1992; Alvarez et al., 1993; *Fagus sylvatica* - Tichomirow, 1896; Ceruti, 1965; *Juglans regi* - Tichomirow, 1896; *Juglans* spp. and *Juniperus* sp. - Gaignebet, 1923; *Picea abies*, *Pinus halepensis* and *P. sylvestris* - Tichomirow, 1896; *Pinus* spp. - Mattirolo, 1910; *Populus tremula* - Tichomirow, 1896; *Populus* spp. - Mattirolo, 1910; Ceruti, 1965, 1968; *Quercus* spp. - Gaignebet, 1923; Ceruti, 1968; *Q. coccifera* - Mattirolo, 1910; Ceruti, 1965; *Q. ilex* - Tichomirow, 1896; Ceruti, 1965; Alvarez et al., 1993; *Q. petraea* and *Q. pubescens* - Tichomirow, 1896; Ceruti, 1965; *Q. robur* - Tichomirow, 1896; Ceruti, 1965; Buscot & Kottke, 1990; *Salix* spp. - Mattirolo, 1910; Ceruti, 1965; *S. alba* - Tichomirow, 1896.

Tuber mesentericum Vittad.
Castanea sativa - Alvarez et al., 1993

Tuber murinum R. Hesse
Alnus rubra and *Pseudotsuga menziesii* - Trappe, 1971a

Tuber nitidum Vittad.
Carpinus betulus and *Corylus avellana* - Fontana & Centrella, 1967; *Quercus ilex* - Alvarez et al., 1993; *Q. ilex* subsp. *ballota** - Moreno et al., 1991; *Populus* sp. - Fontana & Centrella, 1967.

Tuber panniferum Tul. & C. Tul.
Quercus ilex - Alvarez et al., 1993; *Q. ilex* subsp. *ballota** - Moreno et al., 1991

Tuber puberulum Berk. & Broome
Picea abies - Blaschke, 1987; *Quercus ilex* - Alvarez et al., 1993

Tuber rufum Pico (= *T. ferrugineum* Vittad.)
Castanea sativa - Alvarez et al., 1993; *Cistus incanus* ssp. *incanus* - Giovanetti & Fontana, 1982; *Corylus avellana* - Fontana & Centrella, 1967; Alvarez et al., 1993; *Corylus* spp. - Mattirolo, 1935; *Pinus* sp., *Quercus faginea*, and *Q. ilex* - Alvarez et al., 1993; *Quercus* sp. - Mattirolo, 1935

Tuber sinense Tae & Liu
Pinus armandii and *P. yunnanesis* - Zhang & Wang, 1990

Tuber texense Heimsch
Carya illinoiensis - Hanlin et al., 1989

Benny & Kimbrough (1980) suggested that *Dendrosphaera*, a simple monotypic genus of the family Dendrosphaeraceae (Onygenales - Plectomycetes), might be mycorrhizal. This fungus forms rhizomorphs which grow deeply within the soil. If this is the case, one more order of Ascomycota could be considered as having ectomycorrhizal species. The family Dendrosphaeraceae was considered as a family of uncertain affinities by Eriksson & Hawksworth (1987).

There are listed 115 species representing 42 genera and 14 families of Ascomycota which have been shown to form ectomycorrhizal associations with more than 130 species of vascular plants. This probably represents only a small part of the plants and fungi which are associated in nature, most of which remain unknown.

ACKNOWLEDGEMENTS

We would like to thank Drs. Gerry Benny, Richard Hanlin, and James Trappe for reviewing the manuscript and making helpful corrections, comments and suggestions. We are especially thankful to Dr. Richard P. Korf for the time and effort he made in carefully reviewing the manuscript and helping to correct problems in nomenclature and author citations. Leonor C. Maia acknowledges grant support from CNPq and FACEPE.

LITERATURE CITED

AGERER, R. 1986. Studies on Ectomycorrhizae II. Introducing remarks on characterization and identification. Mycotaxon **26**: 473-492.

ALEXANDER, I. J. & HOGBERG, P. 1986. Ectomycorrhizas of tropical angiospermous trees. New Phytologist **102**: 541-549.

ALSHEIKH, A. M. & TRAPPE, J. M. 1983. Desert truffles: the genus *Tirmania*. Transactions of the British Mycological Society **81**: 83-90.

ALSHEIKH, A. M. & TRAPPE, J. M. 1983. Taxonomy of *Phaeangium lefebvrei*, a desert truffle eaten by birds. Canadian Journal of Botany **61**: 1919-1925.

ALVAREZ, I., PARLADÉ, J., TRAPPE, J., & CASTELLANO, M. 1993. Hypogeous mycorrhizal fungi of Spain. Mycotaxon **47**: 201-217.

AWAMEH, M. S. & ALSHEIKH, A. M. 1979. Laboratory and field study of four kinds of truffle (kameh), *Terfezia* and *Tirmania* species for cultivation. Mushroom Science **10**: 507-517.

BEATON, G. & MALAJCZUK, N. 1986. A new species of *Labyrinthomyces* from Western Australia. Transactions of the British Mycological Society **86**: 503-507.

BENNY, G. & KIMBROUGH, J. W. 1980. A synopsis of the orders and families of Plectomycetes with keys to genera. Mycotaxon **12**: 1-91.

BERNDT, R., KOTTRE, J., & OBERWINKLER, F. 1990. Ascomycete mycorrhizas from pot-grown silver-fir seedlings (*Abies alba* Mill.). New Phytologist **115**: 471-482.

BINYAMINI, N. 1980. Addenda to the hypogeos mycoflora of Israel. Nova Hedwigia **32**: 9-20.

BLASCHKE, H. 1987. Vorkommen und Charakterisierung der Ektomykorrhizaassoziation Tuber puberulum mit *Picea abies*. Zeitschrift fur Mykologie **53**: 283-288.

BLEDSOE, C., KLEIN, P., & BLISS, L. C. 1990. A survey of mycorrhizal plants on Truelove lowland, Devon Island, N. W. T., Canada. Canadian Journal of Botany **68**: 1848-1856.

BRUNNER, I. L., BRUNNER, F., & MILLER, O. K. 1990. Ectomycorrhizal synthesis with Alaskan *Alnus tenuifolia*. Canadian Journal of Botany **68**: 761-767.

BUSCOT, F. & KOTTKE, I. 1990. The association of *Morchella rotunda* (Pers.) Boudier with roots of *Picea abies* (L.) Karst. New Phytologist 116: 425-430.

BOULARD, B. 1961. Quelques conseils pour l'étude des micorrhizes. 1re Partie: la collecte de materiel. Bulletin de la Société Linnéenne de Normandie 10: 195-199.

BOULARD, B., & DOMINIK, T. 1966. Etude des mycorrhizes ectotrophes constituées par les essences forestières en Margeride. Journal d'Agriculture Tropicale et de Botanique Appliquée 8: 183-206.

BUSSETTI, L. 1962. Sulle micorrize dei tigli. Allionia 8: 45-54.

CARPENTER, S. E. 1988. Leotiales, a name to replace Helotiales (Ascomycotina). Mycologia 80: 127-130.

CASTELLANO, M. A. & TRAPPE, J. A. 1985. Mycorrhizal associations of five species of Monotropoideae in Oregon. Mycologia 77: 499-502.

CERUTI, A. 1965. La tartuficoltura in Italia. Annalie dell'Accademia Agricolture Torino 107: 131-142.

CERUTI, A. 1968. Biologia e possibilitá di coltivazione dei tartufi. Proceedings of 1st. Congress Internationale sul Tartufo (Spoleto), 14p.

COLLA, S. 1931. Sulla micorriza di *Dryas octopetala*. Atti della Societa Italiana di Scienze Naturali e del Museu Civico di Storia Naturale in Milano 70: 160-161.

COOKE, R. 1977. The Biology of Symbiotic Fungi. John Wiley & Sons. London.

CHRISTY, E. J., SOLLINS, P., & TRAPPE, J. M. 1982. First-year survival of *Tsuga heterophylla* without mycorrhizae and subsequent ectomycorrhizal development on decaying logs and mineral soil. Canadian Journal of Botany 60: 1601-1605.

DANIELSON, R. M. 1979. Hypogeous Ascomycetes in Alberta, Canada with two new North American records. Mycotaxon 9: 445-450.

DANIELSON, R. M. 1984. Ectomycorrhiza formation by the operculate discomycete *Sphaerosporella brunnea*. Mycologia 76: 454-460.

DANIELSON, R. M. & PRUDEN, M. 1989. The ectomycorrhizal status of urban spruce. Mycologia 81: 339-341.

DANIELSON, R. M. & VISSER, S. 1989. Effects of forest soil acidification on ectomycorrhizal and vesicular-arbuscular mycorrhizal development. New Phytologist 112: 41-47.

DIXON, R. K., RAO, M. V., & GARG, V. K. 1993. Salt stress affects in vitro growth and in situ symbiosis of ectomycorrhizal fungi. Mycorrhiza 3: 63-68.

DOMINIK, T. & PACHLEWSKI, R. 1956. Investigations on mycotrophism of plant associations in the lower timber zone of the Tatra. Acta Societatis Botanicorum Poloniae 25: 3-26.

ECKBLAD, F. E. 1962. Studies in the hypogaean fungi of Norway II. Revision of the genus *Elaphomyces*. Nytt Magasin for Botanikk 9: 199-210.

EGGER, K. N., DANIELSON, R. M. & FORTIN, J. A. 1991. Taxonomy and population structure of E-strain mycorrhizal fungi inferred from ribosomal and mitochondrial DNA polymorphisms. Mycological Research 95: 866-872.

EKWEBELAM, S. A. 1980. Preliminary studies of inoculation of *Pinus* species with ectomycorrhizal fungi in Nigeria. In: Tropical Mycorrhiza Research. (Ed. by P. Mikola), pp. 80-81. Oxford University Press, New York.

ERLAND, S. & SODERSTROM, B. 1990. Effects of liming on ectomycorrhizal fungi infecting *Pinus sylvestris* L. New Phytologist 115: 675-682.

ERIKSSON, O. & HAWKSWORTH, D. L. 1987. Outline of the ascomycetes. Systema Ascomycetum 6: 259-338.

FASSI, B. & FONTANA, A. 1967. Sintesi micorrizica tra *Pinus strobus* e *Tuber maculatum*. I. Micorrize e sviluppo dei semenzali nel secondo anno. Allionia 13: 177-186.

FOGEL, R. & TRAPPE, J. M. 1976. Additions to the hypogeous mycoflora of Colorado. I. Ascomycetes. Mycotaxon 4: 211-217.

FONTANA, A. & CENTRELLA, E. 1967. Ectomicorrize prodotte da funghi ipogei. Allionia 13: 149-176.

FONTANA, A. & PALENZONA, M. 1969. Sintesi micorrizica di *Tuber albidum* in cultura pura, con *Pinus strobus* e pioppo euroamericano. Allionia 15: 99-104.

FRANK, A. B. 1885. Ueber die auf Wurzelsymbiose beruhende Ernahrung gewisser Baume durch unterirdische Pilze. Berichte der Deutschen Botanischen Geseleschaft 3: 128-145.

FRANK, A. B. 1887. Ueber neue Mykorrhiza-formen. Berichte der Deutschen Botanischen Geseleschaft 5: 395.

GAIGNEBET, J. 1923. La culture de la truffe dans le causse de martel. Revue Botanique Appliquée 3: 660-666.

GARRIDO, N. 1986. Survey of ectomycorrhizal fungi associated with exotic forest trees in Chile. Nova Hedwigia 43: 423-442.

GIOVANETTI, G. & FONTANA, A. 1981. Simbiosi micorrizica di *Tuber macrosporum* Vitt. con alcune Fagales. Allionia 24: 13-17.

GIOVANETTI, G. & FONTANA, A. 1982. Mycorrhizal synthesis between Cistaceae and Tuberaceae. New Phytologist 92: 533-537.

GODBOUT, C. & FORTIN, J. A. 1983. Morphological features of synthesized ectomycorrhizae of *Alnus crispa* and *A. rugosa*. New Phytologist 94: 249-262.

GUINIER, P. 1949. Les champignons et la forêt. Memoires de la Société d'Histoire Naturelle Afrique du Nord 2: 137-145.

HANLIN, R. T., WU, M.-L., & BRENNEMAN, T. B. 1989. The occurrence of *Tuber texense* in Georgia. Mycotaxon 34: 387-394.

HARLEY, J. L. & HARLEY, E. L. 1987. A check-list of mycorrhiza in the British flora. New Phytologist 105: 1-102.

HARLEY, J. L. & SMITH, S. E. 1983. Mycorrhizal Symbiosis. Academic Press, London.

HARMAJA, H. 1986. Studies on the Pezizales. Karstenia 26: 41-48.

HAWKER, L. E. 1954. British hypogeous fungi. Philosophical Transactions of the Royal Society of London 237: 429-546.

HEIM, R. 1957. Les champignons d'Europe. Vol. 1. Boubée & Co., Paris.

IMAI, S. 1929. On the fungus-inhabiting *Cordyceps* and *Elaphomyces* in Japan. Transactions of the Sapporo Natural History Society 11: 31-37.

KASUYA, M. C. M., MUCHOVEJ, R. M. C., & MUCHOVEJ, J. J. 1990. Influence of aluminum on in vitro formation of *Pinus caribaea* mycorrhizae. Plant and Soil **124**: 73-77.

KENDRICK, B. 1992. The Fifth Kingdom. Mycologue Publications, Waterloo, Ontario.

KHOKHRYAKOV, M. K. 1956. Mycorrhizae. In: Fungi - friends and enemies of man. (Ed. by M. V. Gorlenki), pp. 178-181. Gosud. Izdatel. "Soviet. Nanka", Moscow.

KIRK, P. M. & ANSELL, A. E. (compilers). 1992. Authors of Fungal Names. Index of Fungi. Supplement. 95 pp.

KLINKOVA, T. 1954. Higher fungi of the Votosha Mountains - an ecological sketch. Trudy Akademii Nauk Bulgaria. Sofia.

KOHN, L. M., SUMMERBELL, R., & MALLOCH, D. W. 1986. A new inoperculate discomycete isolated with roots of *Picea*. Mycologia 78: 934-940.

KOPE, H. H. & WARCUP, J. H. 1986. Synthesized ectomycorrhizal associations of some Australian herbs and shrubs. New Phytologist **104**: 591-599.

KORF, R. P. & ZHUANG, W. 1985. Some new species and new records of Discomycetes in China. Mycotaxon **22**: 483-514.

KROEHLER, C. J., ANTIBUS, R. K., & LINKINS, A. E. 1988. The effects of organic and inorganic phosphorus concentration on the acid phosphatase activity of ectomycorrhizal fungi. Canadian Journal of Botany **66**: 750-756.

KROPP, B. & TRAPPE, J. M. 1982. Ectomycorrhizal fungi of *Tsuga heterophylla*. Mycologia **74**: 479-488.

LAURSEN, G. A. & CHMIELEWSKI, M. A. 1980. The ecological significance of soil fungi in Arctic tundra. In: Arctic and Alpine Mycology. (Ed. by G. A. Laursen & J. F. Ammirati), pp. 432-490. University of Washington Press, Seattle.

LE DUC, J. P., DEXHEIMER, J., & CHEVALIER, G. 1986. Etude ultrastructure comparée des associations de *Terfezia leptoderma* avec *Helianthemum salicifolium*, *Cistus albidus*, et *Cistus salviaefolius*. In: Gianinazzi-Pearson, V., and Gianinazzi, S. Physiological and Genetic Aspects of Mycorrhizae. CNRS-INRA, Dijon.

LEWTON-BRAIN, L. 1901. *Cordyceps ophioglossoides* (Ehrh.). Annals of Botany 15: 521-531.

LUBELSKA, B. 1953. O wystepwaniu trufli (*Tuber* Mich. i *Choiromyces* Vitt.) w Polsce. Polsk. Towar. Bot. Fragmenta Floristica et Geobotanica 1: 87-95.

LUSK, D. E. 1987. *Pseudaleuria quinaultiana* a new genus and species of operculate ascomycete from the Olympic Peninsula. Mycotaxon 30: 417-431.

MALENÇON, G. 1973. Champignons hypogés du nord de l'Afrique. I. Ascomycétes. Persoonia 7: 261-168.

MAMOUN, N. & OLIVIER, J. M. 1992. Effect of soil Pseudomonads on colonization of hazel roots by the ectomycorrhizal species *Tuber melanosporum* and its competitors. Plant and Soil **139**: 265-273.

MARKS, G. C. & FOSTER, R. C. 1973. Structure, morphogenesis and ultra-structure of Ectomycorrhizae. In: Ectomycorrhizae: their ecology and physiology. (Ed. by G. C. Marks & T. T. Kozlowski), pp. 2-41. Academic Press, New York.

MARKS, G. C. & KOZLOWSKI, T. T. 1973. Ectomycorrhizae: their ecology and physiology. Academic Press, New York.

MARKS, D. H. & KRUPA, S. V. 1978. Mycorrhizae. A. Ectomycorrhizae. In: Developments in Agricultural and Managed-Forest Ecology, 4. (Ed. by Y. R. Dommergues & S. V. Krupa). Elsevier Scientific Publishing Company. New York.

MASER, C., TRAPPE, J. M., & NUSSBAUM, R. A. 1978. Fungal-small animal inter relationships with emphasis on Oregon coniferous forest. Ecology **59**: 799-809.

MASON, P. A., LAST, F. T., PELHAM, J., & INGLEBY, K. 1982. Ecology of some fungi associated with an ageing stand of birches (*Betula pendula* and *B. pubescens*). Forest Ecology and Management **4**: 19-39.

MASSICOTTE, H. B., TRAPPE, J. M., PETERSON, R. L., & MELVILLE, L. H. 1992. Studies on *Cenococcum geophilum*. II. Sclerotium morphology, germination, and formation in pure culture and growth pouches. Canadian Journal of Botany **70**: 125-132.

MATTIROLO, O. 1910. I tartufi. Come si coltivano in Francia. Perché non si coltivano e come si potrbbero coltivare in Italia. Annali dell' Academia di Agricolture di Torino **52**: 1-74.

MATTIROLO, O. 1932. Di un nuova centro di produzione del tartufo bianco del Piemont (*Tuber magnatum* Pico) in Istria. Annali dell' Academia di Agricolture di Torino **51**: 37-46.

MATTIROLO, O. 1933. I funghi ipogei della Campania, del Lazio, e del Molise raccolti compianto Prof. Carlo Campbell. Nuovo Giornale Botanica Italiano **40**: 313-326.

MATTIROLO, O. 1934. Rapporti simbiotici sviluppatisi tra il tartufo "bianchetto" (*Tuber borchii* Vittadini) et i pioppi americani detti canadesi. Annali dell' Academia di Agricolture di Torino **76**: 3-10.

MATTIROLO, O. 1935. Catalogo ragionato dei funghi ipogei raccolti nel Canton Ticino e nelle provincie italiane confinanti. Contributione Flora Crittogama Svizzera **8**: 1-55.

McGEE, P. A. 1988. Growth response to and morphology of mycorrhizas of *Thysanotus* (Anthericaceae: Monocotyledonae). New Phytologist **109**: 459-463.

MELIN, E. 1923. Experimentelle Untersuchungen über die Konstitution and Ökologie der Mykorrhizen von *Pinus sylvestris* und *Picea abies*. Mykologische Untersuchungen Berlin **2**: 72-331.

MELIN, E. 1925. Untersuchungen uber die Bedeutung der Baummykorriza. G. Fischer, Jena.

MIKOLA, P. 1980. Tropical Mycorrhiza Research. Oxford University Press, New York.

MILLER, S. L. & MILLER, O. K. 1984. Synthesis of *Elaphomyces muricatus* + *Pinus sylvestris* ectomycorrhizae. Canadian Journal of Botany 62: 2363-2369.

MOLINA, R. & TRAPPE, J. M. 1982. Patterns of ectomycorrhizal host specificity and potential among Pacific Northwest conifers and fungi. Forest Science 28: 423-458.

MORENO, G., GALAN, R., & MONTECCHI, A. 1991. Hypogeous fungi from peninsular Spain. II. Mycotaxon 62: 201-238.

NEWTON, A. C. 1991. Mineral nutrition and mycorrhizal infection of seedling oak and birch. III. Epidemiological aspects of ectomycorrhizal infection, and the relationship to seedling growth. New Phytologist 117: 53-60.

NEWTON, A. C. & PIGOTT, C. D. 1991a. Mineral nutrition and mycorrhizal infection of seedling oak and birch. I. Nutrient uptake and the development of mycorrhizal infection during seedling establishment. New Phytologist 117: 37-44.

NEWTON, A. C. & PIGOTT, C. D. 1991b. Mineral nutrition and mycorrhizal infection of seedling oak and birch. II. The effect of fertilizers on growth, nutrient uptake and ectomycorrhizal infection. New Phytologist 117: 49-52.

ORLOS, H. 1961. Grzyby w srodowisku lesnym podzial na grupy ekologieczne i ocena funkcji ekologicyznej. Sylwan 105: 61-68.

PACHLEWSKI, R. 1967. Investigations of pure culture of mycorrhizal fungi of pine (*Pinus sylvestris* L.). Forest Research Institute., Warsaw.

PALENZONA, M. 1969. Sintesi micorrizica tra *Tuber aestivum* Vitt., *Tuber brumole* Vitt., *Tuber melanosporum* Vitt. e semenzali di *Corylus avellana* L. Allionia 15: 121-131.

PARGNEY, J. C. 1990. Essais de caractérisation cytochimique des structures de l'interface au niveau du réseau de Hartig dans l'association ectomycorrhizienne entre la truffe (*T. melanosporum*) et le noisetier (*Corylus avellana*). Canadian Journal of Botany 68: 2722-2728.

PARMASTO, E. 1958. Limatunnik-omaparane kevadseen. Eesti Loodus, 106-107.

PASQUALINE, S., PANARA, F., & ANTONIELLI, M. 1992. Acid phosphatase activity in *Pinus pinea* - *Tuber albidum* ectomycorrhizal association. Canadian Journal of Botany 70: 1377-1383.

PEYRONEL, B. 1929. Le micorize delle essesze forestali. L'Alpe, 309-315.

PIGOTT, C. D. 1982. Fine structure of mycorrhiza formed by *Cenococcum geophilum* Fr. on *Tilia cordata* Mill. New Phytologist 92: 501-512.

RAYSS, T. 1959. Champignons hypogés dans les régions desertiques d'Israel. In: Academia Republique Popular Romine (Ed. by Omagiu lui Traian Savulescue), pp. 655-659. Bucarest.

REESS, M. 1885. Ueber *Elaphomyces* und sonstige Wurzelpilze. Berichte der Deutschen Botanischen Geseleschaft 3: 293-295.

REESS, M. & FISCH, C. 1887. Untersuchungen uber Bau und Lebensgeschichte der Hirschtruffel, *Elaphomyces*. Bibliotheca Botanica 7: 1-24.

SAMSON, J. & FORTIN, J. A. 1986. Ectomycorrhizal fungi of *Larix laricina* and the interespecific variation in response to temperature. Canadian Journal of Botany 64: 3020-3028.

SCALES, P. F. & PETERSON, R. L. 1991. Structure of ectomycorrhizae formed by *Wilcoxina mikolae* var. *mikolae* with *Picea mariana* and *Betula alleghaniensis*. Canadian Journal of Botany 69: 2149-2157.

SCANNERINI, S. & PALENZONA, M. 1967. Ricerche sulle ectomicorrize di *Pinus strobus* L. in vivaio. 3. Micorrize di *Tuber albidum* Pico. Allionia 13: 187-194.

SCHENCK, N. C. 1982. Methods and Principles of Mycorrhizal Research. APS Press, Minnesota.

STATES, J. S. 1983. New records of hypogeous Ascomycetes in Arizona. Mycotaxon 16: 396-402.

STEWART, E. L. & HEBLACK, R. 1979. Hypogeous fungi of Minnesota: *Genea anthracina* sp.nov. Mycotaxon 9: 451-458.

TAM, P. C. F. & GRIFFTHS, D. A. 1993a. Mycorrhizal associations in Hong Kong Fagaceae. I. Techniques for the rapid detection and observation of ectomycorrhizas in local genera. Mycorrhiza 2: 111-115.

TAM, P. C. F. & GRIFFITHS, D. A. 1993b. Mycorrhizal associations in Hong Kong Fagaceae. II. The formation of mycorrhizas in *Quercus myrsinaefolia*. Mycorrhiza 2: 117-123.

TERMORSHUIZEN, A. & SCHAFFERS, A. 1991. The decline of carpophores of ectomycorrhizal fungi in stands of *Pinus sylvestris* L. in The Netherlands: possible causes. Nova Hedwigia 53: 267-289.

THEODOROU, C. & REDDELL, P. 1991. In vitro synthesis of ectomycorrhizas on Casuarinaceae with a range of mycorrhizal fungi. New Phytologist 118: 279-288.

TICHOMIROW, W. 1896. Kaukasische Truffel: *Terfezia transcaucasica*, und die Verfalschung der franzosischen Handelstruffel in Moskau. Pharmaceutische Zietschrift Russland 35, 45p.

TRAPPE, J. M. 1962. Fungus associates of Ectotrophic Mycorrhizae. Botanical Review 28: 538-606.

TRAPPE, J. M. 1964. Mycorrhizal hosts and distribution of *Cenococcum graniforme*. Lloydia 27: 100-106.

TRAPPE, J. M. 1971a. Mycorrhiza-forming Ascomycetes. In: Mycorrhizae (Ed. by E. Hacskaylo), pp. 19-37. USDA, Forest Service, Miscellaneous Publication 1189.

TRAPPE, J. M. 1971b. A synopsis of the Carbomycetaceae and Terfeziaceae (Tuberales). Transactions British Mycological Society 57: 85-92.

TRAPPE, J. M. 1975. The genus *Fischerula* (Tuberales). Mycologia 67: 934-941.

TRAPPE, J. M. 1976. Notes on Japanese hypogeous Ascomycetes. Transactions of the Mycological Society of Japan 17: 209-217.

TRAPPE, J. M. 1979. The orders, families and genera of hypogeous Ascomycotina (truffles and their relatives). Mycotaxon 9: 297-340.

TRAPPE, J. M. & KIMBROUGH, J. W. 1972. *Elaphomyces viridiseptum*, a new species from Florida. Mycologia 64: 646-649.

TRAPPE, J. M. & SALINAS QUINARD, R. 1966. *Cenococcum graniforme* in Mexico. Mycologia 68: 647-648.

TRAPPE, J. M. & SUNDBERG, W. 1977. *Terfezia gigantea* in North America. Mycologia 69: 433-437.

TRAPPE, J. M., CASTELLANO, M. A., & MALAJCZUK, N. 1992. Australasian Truffle-like Fungi. II. *Labyrinthomyces*, *Dingleya* and *Reddellomyces* gen. nov. (Ascomycotina). Australian Systematic Botany 5: 597-611.

TULASNE, L. R. & TULASNE, C. 1841. Observations sur le genre *Elaphomyces*, et description de quelques especès nouvelles. Annales des Sciences Naturelles Service 16: 5-29.

ULBRICH, E. 1936. Ergebnisse neuerer Forschungen über die Mykorrhiza. Sitzungsberichte der Geselischaft Naturforschender. Freunde zu Berlin: 260-274.

VITTADINI, C. 1831. Monographia Tuberacearum. Felicis Rusconi, Milan.

YANG, C. S. & KORF, R. P. 1985. A monograph of the genus *Tricharina* and of a new, segregate genus, *Wilcoxina* (Pezizales). Mycotaxon 24: 467-531.

WARCUP, J. H. 1990. Occurrence of ectomycorrhizal and saprophytic discomycetes after a wild fire in a eucalypt forest. Mycological Research 94: 1065-1069.

WARCUP, J. H. 1991. The fungi forming mycorrhizas on eucalypt seedlings in regeneration coupes in Tasmania. Mycological Research 95: 329-332.

WARCUP, J. H. & TALBOT, P. H. B. 1989. *Muciturbo*: a new genus of hypogeous ectomycorrhizal Ascomycetes. Mycological Research 92: 95-100.

ZAK, B. 1973. Classification of Ectomycorrhizae. In: Ectomycorrhizae: their ecology and physiology. (Ed. by G. C. Marks & T. T. Kozlowski), pp. 43-78. Academic Press, New York.

ZHANG, D. C. 1991. Revision of Chinese species of *Elaphomyces* (Ascomycotina, Elaphomycetales). Mycological Research 95: 973-985.

ZHANG, B. C. & MINTER, D. W. 1988. Two new species of *Labyrinthomyces* from New Zealand, with notes on the taxonomy of the genus. Systema Ascomycetum 7: 45-55.

ZHANG, B. C. & WANG, Y. 1990. Studies on the chinese truffle and its ecology. Edible fungi of China. Zhonggo-Shiyongjun.

ZHU, H. & NAVRATIL, S. 1987. Effects of seed source and fungus on growth and ectomycorrhizal formation of *Tamarack* seedlings. In: 7th. North American Conference on Mycorrhiza. (Ed. by D. M. Sylvia; L. L. Hung & J. H. Graham), p. 113. IFAS, University of Florida, Gainesville.

MYCOTAXON

Volume LVII, pp. 391-409 January-March 1996

ALTERNARIA THEMES AND VARIATIONS (145—149)

EMORY G. SIMMONS

717 Thornwood Road, Crawfordsville, IN 47933

ABSTRACT

Two *Alternaria* taxa with a low degree of conidium complexity are introduced: *A. cetera* Simmons, sp. nov. (from *Elymus scabrus* var. *plurinervis* and *Triticum* sp.), and *A. incomplexa* Simmons, sp. nov. (from canal mud). Presented also are two novel taxa isolated from horticultural poinsettia (*Euphorbia pulcherrima*): *A. pseudorostrata* Simmons, sp. nov., and *A. rostellata* Simmons, sp. nov.; *A. obtecta* Simmons is reviewed on the basis of fresh isolates from the same poinsettia source.

XXII. SPECIES WITH "PRIMITIVE" CONIDIUM TRAITS.

For many years I have held three hyphomycetous isolates that always bring to my mind the term "primitive *Alternaria*." Some morphological characters of the isolates are recognizably alternarioid, though just barely so in a basic, poorly developed sense, whereas other characters commonly ascribed to the genus show up only under what are to me unusual culture conditions that I never use routinely for comparisons. If it can be agreed that these attributes suggest a kind of primitiveness or relatively low degree of complexity in *Alternaria*, then these isolates are good examples of such a status.

The three isolates, all of the same taxon, reached me with histories as follows:

1958 EGS 12-128 from C. T. Rogerson, KSC B926(-)2, isolated from air, Manhattan, Kansas, 11/26/57.

1969 EGS 22-060 via IMI 113777, as isol. ex *Triticum* sp. (sterilized grain), H. L. Harvey WA204, S. Perth, W. Australia, recd. IMI 17 June 1965.

1984 EGS 38-058 via **IMI** 285674, as isol. ex *Agropyron scabrum* (R. Br.) Beauv. var. *plurinerve* Vick. (now *Elymus scabrus* (R. Br.) Á. Löve var. *plurinervis* (Vick.) B. Simon, Australia.

1993 EGS 41-072 = EGS 38-058 (1984, above), via J. Alcorn, as **BRIP** 14240, R. G. Rees WI.1906, ex leafspot of *Elymus scabrus* var. *plurinervis*, Weier River, Queensland, Australia, 23 March 1984 (with lowkey but unmistakable Alcorn encouragement to get on with it).

Indicative alternarioid characters in routine culture (PCA, Hay, V-8; see protocols in Simmons and Roberts 1993) include discrete, septate primary conidiophores occurring as lateral branches on vegetative hyphae; production of primary conidia through the apex of the conidiophore; geniculate proliferation of conidiophores lateral to conidiogenous sites; and production of secondary conidia in acropetal chains.

However, the large numbers of conidia produced on these media initially appear as relatively narrow cells, almost mega-bacilliform in outline, with only a suggestion of ovoidness in the spore body (Fig. 122). Transeptation is suggested (at 195X and 780X) by 2-3 pale discontinuities in the very dilute tan of the spore body.

The microscopic picture of conidia and chains of this fungus (e.g., on PCA) has little in common with textbook or identification manual illustrations of *Alternaria*. I would not be surprised to find that this taxon has been described in some other genus with catenulate, poorly septate conidia. (I have searched for one, but not exhaustively.) In any case, I would dispute its classification elsewhere than with *Alternaria*.

Supporting evidence for this opinion is derived from the morphology of conidia produced in colonies developed on Czapek's agar (3% sucrose). In the 1950s and 1960s, before I decided that high-sugar media (e.g., potato/dextrose agar, agars containing malt/maltose concoctions, and Czapek's agar) were excellent for producing masses of vegetative mycelium but practically worthless for production of useful quantities of distinctive *Alternaria* conidia, I would use a battery of a dozen or so media for unusual isolates in hope of acquiring some differential character data. For this *Alternaria* taxon, Czapek's agar proved to be the key factor in production of conidia that most mycologists would recognize as typically alternarioid. Other media or growth conditions might induce the same effect; Czapek's agar (Cz) worked in this instance.

Sporulation in colonies on Cz initially is similar to that on PCA: branching chains of long-narrow conidia with indistinct transeptation. Within 5 da., however, numerous conidia enlarge to typical long-ovoid or obclavate shapes, with several distinct transverse eusepta and occasionally a single longitudinal septum in one of the central transverse compartments.

145. **Alternaria cetera** Simmons, sp. nov. Fig. 122

Etym.: L., *cetera*, other, as in other-ness, being similar but in itself unique; but better, an excuse to use, with high regard, the initials of the first collector/contributor of the taxon, C. T. Rogerson.

Ex culturis in agaris PCA et Czapekii descripta. In agaro PCA, coloniae hyphis epiagaris vel aerie fasciculatis conidiophorogenae; fasciculi ad ca. 1-2 mm. longi, multiconidiophorogeni et conidiogeni. Conidiophora ca. 8-18 x 3-5µm. Sporulatio in catenis longis, strictis, ramosis conidiorum ad 100+ aggregata. Conidia ca. 18-22 x 3-4(-5)µm, peranguste ellipsoidea vel angustiovoidea, obscure septata vel raro 1-3 transverse euseptata, sine septis longitudinalibus, dilute brunneola. In agaro Czapekii coloniae primum subhyalinae, postremo dense lanuginosae, fumosimurinae, sporulatione initio ut in agaro PCA, sed minus abunda. Conidia ad basim catenarum valde evoluta obovata vel obclavata, 40-50 x 7-9µm, dilute brunneola, 5-8 transverse et vulgo 1 longitudinaliter septata. Habitatio typi in folio Elymus scabrus var. plurinervis, Weier River, Queensland, Australia. Holotypus: pars ex cultura EGS 41-072 (ex ***BRIP*** *14240, R. G. Rees WI.1906, 23-III-1984) desiccata et in* ***BPI*** *conservata.*

Colonies on PCA (7 da.) are almost devoid of aerial non-sporulating mycelium. Essentially all vegetative hyphae are surface or subsurface, usually inconspicuous, but also frequently developing as radii of a few parallel, closely adpressed, euseptate hyphal elements.

Solitary primary conidiophores arise directly from surface hyphae or as short lateral branches from variously decumbent aerial fascicles of a few parallel hyphae (to ca. 1-2mm in length) that have the same appearance as subsurface adpressed radial elements. Individual conidiophores are short tubular or somewhat flask-shaped, 0-2 transeptate, commonly 8-18 x 3-5µm, seldom more proliferous than 1-geniculate or 1-branched. The conspicuous aerial fascicles of hyphae bear large numbers of lateral conidiophores and, after their long chains of conidia are produced, have the appearance (50X) of an over-used bottlebrush. Colonies develop a smoky-tan color, which represents the dilute gray-tan pigment of massed hyphae and conidia.

Conidia are produced acropetally in long, straight, narrow, branching chains, resulting in open, bushy tufts of conidia and conidiophores. Nearly all but new terminal conidia are ca. 18-22 x 3-4(-5)μm, regardless of their position in a chain. They are narrowly ellipsoid, becoming barely narrow-ovoid. A few conidia exhibit (780X) 1-3 transverse eusepta; none have longitudinal septa. Color is dilute tan with 2-3 transverse hyaline discontinuities in positions where septa later may be formed.

The apex of each conidium (other than terminal) in a chain functions as a secondary conidiophore. This conidiogenous apex appears superficially to be undifferentiated from the spore body. Usually, however, it is identifiable as a slightly constricted, pale region ca. 1.5 x 2μm. This small apical secondary conidiophore often proliferates laterally, at which time it looks typically alternarioid and serves as the origin of a new branch in the conidial chain.

Sporulation proceeds rapidly and copiously. An individual conidial bush may have 100 or more spores; an aerial fascicle of conidiophorogenous hyphae can be estimated to bear several hundred to a few thousand conidia.

Colonies on Cz are subhyaline during the initial 3-4 da. of development and produce chains of narrow, indistinctly septate conidia like those produced on PCA. Colony texture at ca. 5 da. becomes densely mycelial and darkens. At this age, lowest (oldest) conidia in the chains become long obovate or obclavate, reach a size range of ca. 40-50 x 7-9μm, and are 5-8 transeptate and sometimes 1 longitudinally septate in one of the central segments; color is a dilute tan. Sporulating hyphae do not dominate Cz colonies after ca. 7 da; instead, abundant non-sporulating aerial mycelium takes on the texture and smoky grey color of mouse fur.

146. **Alternaria incomplexa** Simmons, sp. nov. Fig. 123

Etym.: L., *in* + *complexa*, not complicated = poorly developed, refering to septation of most conidia of the taxon.

Ex culturis in agaris PCA et Hay descripta. In agaro PCA coloniae hyphis epiagaris conidiophorogenae. Conidiophora simplicia et 2-3 geniculata vel 1-2 ramosa, ad ca. 100 x 4μm. Sporulatio in catenis longis, ramosis conidiorum

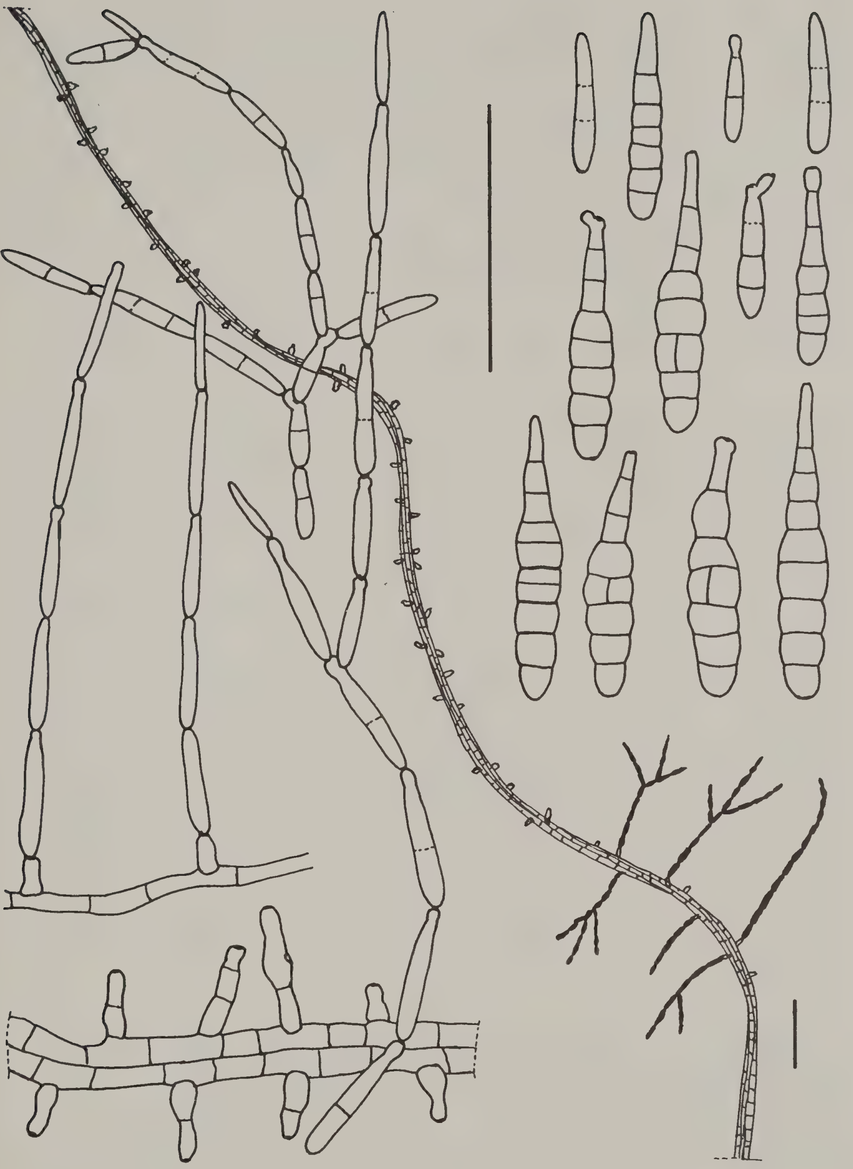


Fig. 122. *Alternaria cetera*: conidia and conidiophores ex type isolate EGS 41-072. At left, 7d PCA; at upper right, 5d Czapek's agar. Habit: decumbent fascicle of aerial hyphae, conidia opaque, conidiophores clear. Bars = 50μm.

centum vel ut videtur innumerorum aggregata. Conidia aliquot prima et ramigena obclavata et pseudorostrata, 30-40 x 8-13µm, transverse 5-8 et longitudinaliter 0-4 septata. Conidia cetera numerosissima ovoidea vel obclavata, 18-25 x 5-8µm, 3(-5) transverse et 0(-1) longitudinaliter septata. In agaro Hay, sporulatio in catenis longis, ramosis. Conidia aliquot prima et ramigena ut in PCA. Conidia cetera numerosissima, anguste ellipsoidea vel ovoidea, 5-20 x 3-5µm, 0-3(-4) transverse septata, sine septis longitudinalibus. Habitatio typi ignota; specimen ex limo fluviali, Cub River Canal, Cache Valley, Franklin Co., Idaho, U.S.A., sejunctum. Holotypus: pars ex cultura EGS 17-103 (QM 8661 ex W. B. Cooke U2-2-12, June 1962) desiccata et in BPI conservata.

Alternaria incomplexa is included here near *A. cetera* only because a high percentage of its conidia do not develop beyond a juvenile 0-3 transeptate stage under routine culture conditions. The sporulation pattern on PCA is similar to that of the *A. infectoria* group (Simmons 1986c, 1994b) in that some of the conidia in any clump of abundantly branched chains are relatively long pseudorostrate. Typically, the initial conidium basal to a sporulation clump, and two to a few other conidia that serve as branching elements in spore chains, are larger, more septate, and more strongly ornamented than the general population. In addition, these larger obclavate conidia terminate in branching or geniculate secondary conidiophores that may be as long as the spore bodies that generate them. These conidia, which make up a very low percentage of total sporulation units, have a size range (excluding pseudorostra) of ca. 30-40 x 8-13µm and are 5-8 transeptate with 0-4 longitudinal septa. Perhaps 95% or more of any sporulation clump consists of ovoid or obclavate units that have a size range of ca. 18-25 x 5-8µm, 3(-5) transverse and 0(-1) longitudinal septa, and secondary conidiophore pseudorostra sometimes as long as the spore body but usually limited to one short cell.

Colonies on PCA lack aerial non-sporulating mycelium. Conidiophores arise directly from surface and subsurface hyphae and characteristically are simple with 2-3 conidiogenous geniculations, or are 1-2 branched, straight or somewhat spirally twisted, and up to ca. 100 x 4µm. Individual sporulation clumps may have ca. 100 to many hundreds of conidia (Fig. 123 habit sketch shows only about half of one very small clump.)

Alternaria incomplexa conidia produced in PCA cultures, unlike those of *A. cetera*, are recognizably alternarioid in all characters. On a low-nutrient medium such as Hay agar, however, *A. incomplexa* conidia (with minor exceptions) do not

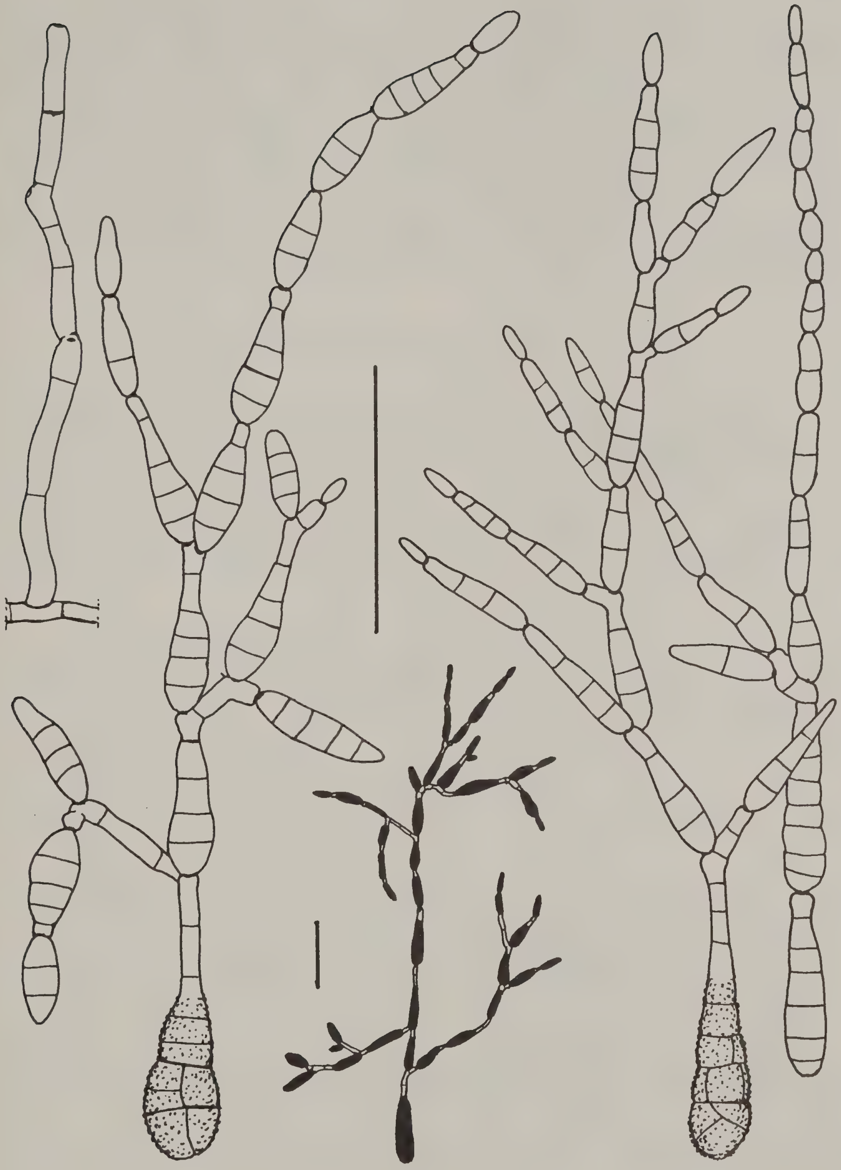


Fig. 123. *Alternaria incomplexa*: conidia and conidiophores ex type isolate EGS 17-103. At left, ex PCA; at right, ex Hay agar. Habit: conidium bodies opaque, conidiophores clear. Bars = 50μm.

develop beyond relatively small, narrowly ellipsoid or ovoid units 5-20 x 3-5µm with 0-3(-4) transverse and no longitudinal septa. These small conidia are produced in rapid succession in long branching chains similar (at 50X) to those of *A. cetera*. The basal one or two conidia in a branching sporulation population are the exceptions, in that, as on PCA, they are much larger than ca. 95% of the population, have relatively rough, thick-walled spore bodies, 5-6 transverse and 3-4 longitudinal septa, and usually a well-defined terminal secondary conidiophore.

XXIII. MORE ALTERNARIA ON EUPHORBIA

All 12 *Alternaria* taxa known to have been described from euphorbiaceous substrates by 1994 have been discussed by Simmons (1986a, 1994a). By that time the presence of at least four distinguishable *Alternaria* species on lesions of the original host gathering of *A. euphorbiae* (Barth.) Aragaki & Uchida (Yoshimura et al. 1985) had induced in me "a state of alternarial shock." The feeling persists as additional isolates from *Euphorbia* species are received.

From October 1994 through early January 1995, C. F. Hill (MAF Quality Management, Lynfield, New Zealand) forwarded slide preparations and isolates of *Alternaria* from diseased leaves of horticultural *Euphorbia pulcherrima* Willd. for taxonomic opinions. The host poinsettias were quarantined units of a commercial shipment that originated in Encinitas, California, U.S.A. Hill suggested that there were five different *Alternaria* taxa among 10 conserved isolates.

There are indeed at least five taxa in the material I have examined from this source. Two are relatively small-spored chain-forming species, not discussed further here. Another two represent relatively large-spored species that I have not seen previously in culture or, I believe, as field specimens. The fifth is *A. obtecta* Simmons (1994), represented by two isolates in more stable, better sporulating condition than was the original isolate that provided the holotype (a strain now lost from my working stocks).

147. **Alternaria pseudorostrata** Simmons, sp. nov. Fig. 124

Etym.: Gk., L., *pseudo + rostrata*, false-beaked, with reference to the very long secondary conidiophores that are a prominent character of the taxon.

Ex cultura in agaro PCA descripta. Conidiophora simplicia vel 1-ramosa, 0-2 geniculata, ad 150-400 x 6-8µm.

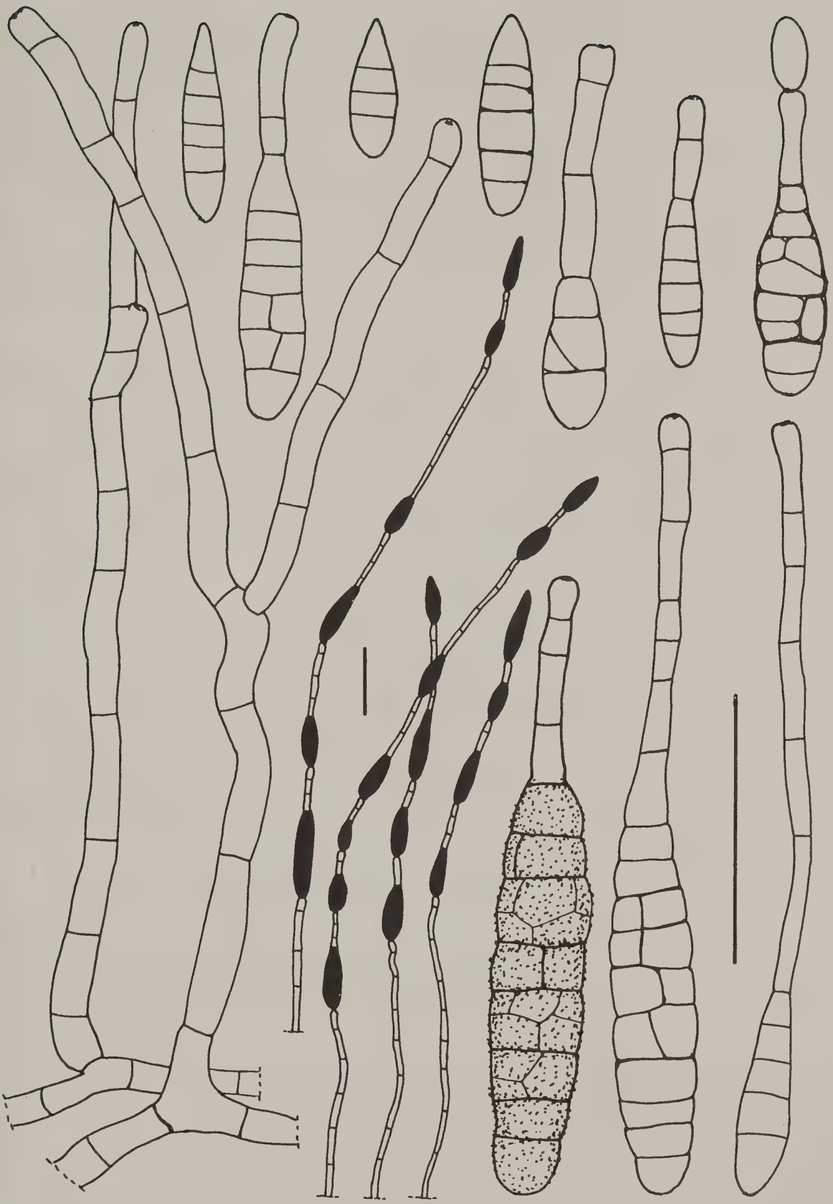


Fig. 124. *Alternaria pseudorostrata*: conidia and conidiophores ex type isolate EGS 42-060 ex PCA. Habit: conidium bodies opaque, conidiophores clear. Bars = 50μm.

Conidia catenulata tot quot 10 (vulgo 3-6). Corpus conidiorum anguste ellipsoideum vel ovoideum in juventute, dein anguste vel late ellipsoideum, usque ad 55-90 x 14-20μm, modice fulvum, granulatum, transverse 8-11 et ex parte longitudinaliter 1-2 septatum, plerumque pseudorostro (conidiophoro secondario) 60-100(-240) x 3-5μm, septato, corpore conidii concoloro. Habitatio typi in folia Euphorbia pulcherrima Willd., in loco valetudini spectandae praestito, S. Auckland, New Zealand, ex horto commerciali Encinitas, California, U.S.A. Holotypus: pars ex cultura EGS 42-060 (LYN 10561A recd. 17 Jan. 1995) desiccata et in ***BPI*** *conservata.*

Colonies of *A. pseudorostrata* on PCA are composed of fine, dark, radiating, surface and subsurface hyphae without appreciable amounts of non-sporulating aerial mycelium. Conidiophores originate in abundance near the agar surface, forming an open stand; they are relatively sturdy in appearance, semi-erect, simple or commonly 1-branched, sometimes proliferating at 1-2 conidiogenous sites, medium brown, with a dominant size range of ca. 150-400 x 6-8μm. Simple chains of as many as 10 (usually 3-6) conidia are produced. Chains may branch by means of two conidiogenous sites in an intercalary pseudorostrum, but usually do not do so.

The initial conidium in an *A. pseudorostrata* chain commonly has a slightly larger spore body than others in the chain. All conidia (except the terminal one in a chain) have a well-defined pseudorostrum but never a true, non-conidiogenous beak. Sometimes the primary conidium also has the longest pseudorostrum, but this is by no means the rule, particularly in chains of 7-10 units, where some other intercalary spore may produce the longest false beak.

The spore body of *A. pseudorostrata* conidia is narrowly ellipsoid or ovoid in youth, becoming narrowly to broadly ellipsoid, 55-90 x 14-20μm, dilute to medium yellowish-brown, smooth-walled to distinctly and evenly punctate-rough overall, with up to 8-11 transepta and 1-2 longitudinal or oblique septa in several of the broadest transverse segments. Young beakless conidia have a rounded to acute apex. The apical cell generates a secondary conidiophore usually 60-100μm long but often as long as 240μm. The developing pseudorostrum is pale, ca. 3μm diam., maturing through most or all of its length with several transepta, enlarging to ca. 4-5μm diam., and becoming concolorous with its conidial base.

Alternaria pseudorostrata resembles poinsettia pathogen *A. euphorbiicola* Simmons & Engelhard (Simmons 1986a) in production of conidia with relatively large spore bodies that are connected in chains through the agency of sturdy apical secondary conidiophores. Both taxa produce their secondary beak structures after the initial erostrate shape of the conidium body has been defined (and, I suspect, probably before it has reached its mature dimensions, a suspicion very difficult to prove). Conidium dimensions of *A. pseudorostrata* and *A. euphorbiicola* overlap, but septation and ornamentation are not the same. Cultures of these two taxa are quite different from each other macroscopically, as are the 50X appearances of chain formation, as follows.

Colonies of *A. pseudorostrata* on PCA and V-8 are an uninterrupted turf of long primary conidiophores arising from close but distinct radiating hyphae near the agar surface. Very abundant but uncrowded long conidiophores generate conidial chains whose extraordinary lengths derive as much from the length of intercalary secondary conidiophores as they do from the lengths of the incorporated (3-10) conidia. The long chains eventually (by 10-14 da.) become entangled thickets, but in early days are seen as separate, semi-erect catenulae.

Colonies of *A. euphorbiicola* on PCA comprise a poorly defined subhyaline mycelium which, unlike that of *A. pseudorostrata*, bears very dark, concentric sporulation rings as the visible response to the alternating light/dark regimen routinely used. Colony appearance on V-8 also suggests concentric rings of sporulation, except that on this medium sporulation is much more abundant and crowded than on PCA. Primary conidiophores from surface hyphae are crowded, commonly are shorter by at least half than those of *A. pseudorostrata*, and bear chains of only 2-3 conidia. The 50X aspect of *A. euphorbiicola* chains never approaches the dramatically long, pseudorostrate appearance presented consistently by *A. pseudorostrata*. *A. euphorbiicola* conidia have smooth walls and a more open septation pattern (fewer septa) than is found in rough-spored *A. pseudorostrata*.

148. **Alternaria rostellata** Simmons, sp. nov. Fig. 125

Etym.: L., *rostellata*, provided with a short [true] beak, as are most conidia of the taxon.

Ex cultura in agaro PCA descripta. Conidiophora simplicia ad ca. 150-200 x 6.5µm, vel multo longiora, aeria, ramis conidiogenis ca. 150-200 x 6.5µm. Conidia solitaria, raro 2 in catenam, anguste ovoidea in juventute, dein late ovoidea, basi late rotunda et apice obtuso vel subacuto, erostrata vel plerumque rostellata. Conidia usque ad ca. 50-

80 x 20-30µm, dilute fulva vel brunnea, laevia vel modice aspera, transverse 7-9 et ex parte longitudinaliter 1-3+ septata, eurostello filamentoso usque ad 30-55 x 2µm sed plerumque breviore. Habitatio typi in folia Euphorbia pulcherrima Willd., in loco valetudini spectandae praestito, S. Auckland, New Zealand, ex horto commerciali Encinitas, California, U.S.A. Holotypus: pars ex cultura EGS 42-061 (LYN 10561B recd. 17 Jan. 1995) desiccata et in ***BPI*** *conservata.*

Colonies of *A. rostellata* on PCA are composed of fine, dark, radiating, surface and subsurface hyphae without appreciable amounts of non-sporulating aerial mycelium. The growth pattern is of concentric rings, which correspond with the imposed diurnal light/dark regimen. Dark rings (viewed at 50X) are composed of abundant, short, crowded, simple or branched conidiophores with a single dark conidium terminating each conidiophore. Lighter rings that alternate with the densely conidial dark ones are composed of very long, erect or variously ascendant, branched conidiophores also with a conidium terminating each branch.

Conidiophores in the dark rings usually are ca. 150-200 x 6.5µm; individual conidiogenous branches in the lighter rings are about the same length but arise from a much longer, sturdy, ascendant primary conidiophore axis.

Most conidia of *A. rostellata* remain solitary. Short chains of two conidia are produced but are very uncommon in the overall spore population. Young conidia are narrow-ovoid; fully developed ones mostly ellipsoid to broadly ovoid, with a broadly rounded base cell and a blunt to subacute apex. Each conidium typically generates a narrow eurostrum from the apical cell. This beak may begin development either while a conidium still is juvenile with only a few transverse septa or later when the conidium base has reached almost full development.

Conidia reach full development in a size range of ca. 50-80 x 20-30µm, with 7-9 transverse septa and 1-3 longitudinal septa in several of the broadest transverse segments, and with outer walls smooth to moderately punctate-rough and a dilute tawny brown, becoming more complexly cellular and dark brown in age. There is an abrupt break in the contour of the conidium apex where it gives rise to the narrow beak. The beak is subhyaline and ca. 30-55 x 2µm or usually shorter. Occasionally a filamentous beak enlarges terminally into a secondary conidiophore ca. 9 x 5µm, initiating a 2-conidium chain. Sometimes a relatively broad secondary conidiophore up to ca. 40 x 6µm develops directly from the

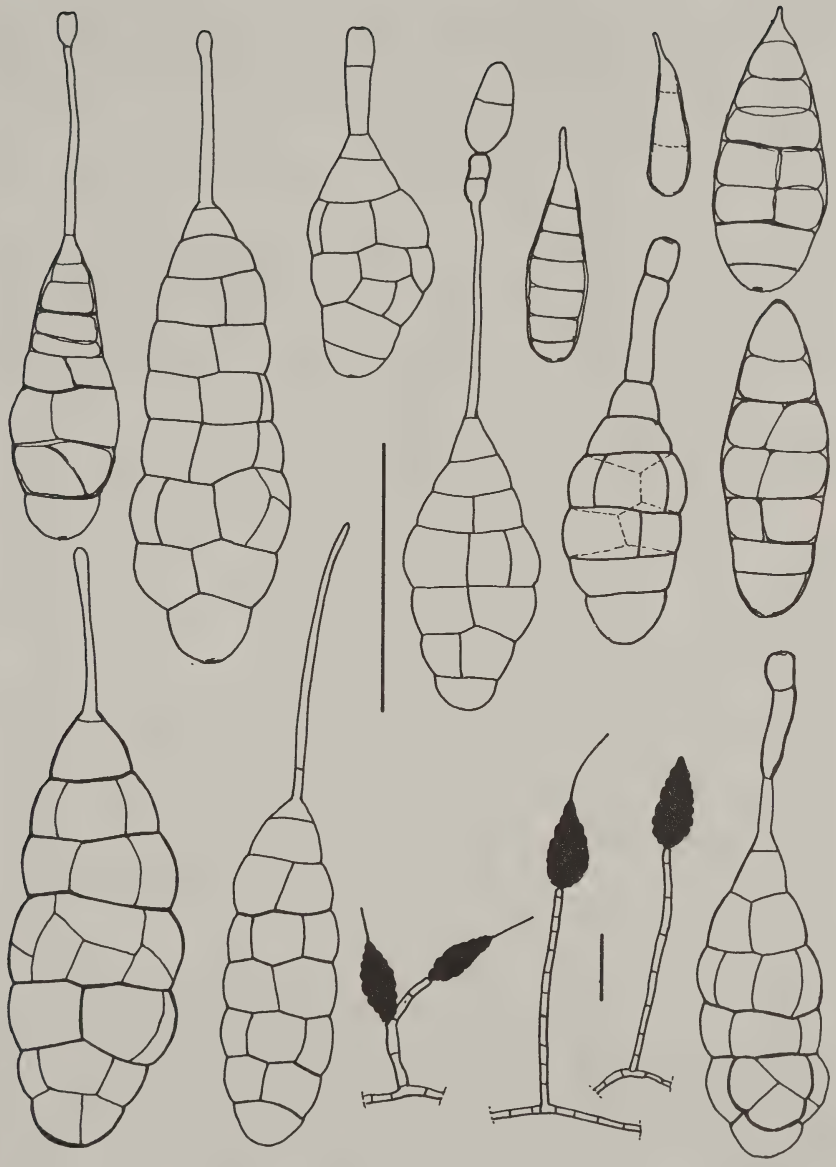


Fig. 125. *Alternaria rostellata*: conidia and conidiophores ex type isolate EGS 42-061, ex PCA. Habit: conidia opaque, conidiophores clear. Bars = 50μm.

conidium apex and generates a secondary conidium without interposition of a true beak. The conspicuous and characteristic condition, however, is of solitary conidia lacking or, predominantly, furnished with a short, stiff filamentous eurostrum.

149. **Alternaria obtecta** Simmons, revisited Fig. 126
Ref.: Simmons (1994a; *Alt.T&V* 98, Fig. 77)

Two isolates of *A. obtecta* from leaf lesions of poinsettia quarantined in New Zealand (EGS 42-063 & 42-064 = LYN 10561D & E; country of origin U.S.A.) are culturally stable and sporulate readily and profusely, which was not true of the original type-yielding isolate of this taxon (EGS 38-189, from *Euphorbia supina*, Louisiana, U.S.A.). Cultures of the original isolate became increasingly vegetative and poorly sporulating in transfers and eventually were lost from my working collection. The two more recent isolates permit additional observations and deposit in public collections.

Conidia of the original isolate and in various herbarium specimens (Simmons 1994a) exhibit a prominent character of spore wall ornamentation that persists throughout development of "pale golden tan" conidia and tends to obscure (*obtecta*) the internal pattern of septation.

Juvenile conidia of the recent New Zealand isolates are pale and without transepta, or with only 2-3 faint indications of septum position. Although young smooth conidia usually become completely and closely punctulate when transverse segments first appear, this obtectant ornamentation becomes less masking as conidia enlarge. A yellowish brown pigment develops in major septa to a degree not found in the type isolate; it contrasts strongly with the dilute color of the spore body.

Fully developed conidia of these recent isolates may appear quite smooth, with septation pattern not at all obscured, or they may be completely punctate-rough. Others may retain limited surface areas of punctulation or simply bear scattered granulations. In any case, the type character of obscurant ornamentation is reduced or lost. Ironically, the type illustration (Simmons 1994a, Fig. 77) is a better depiction of the recent New Zealand isolates than of the earlier type in that, for reasons of laziness, conidium ornamentation, though mentioned, was not drawn for most spores in the figure.

Characters of conidium size, pattern of septation, and beak formation are the same in all isolates of *A. obtecta* seen thus far. Two characters illustrated with the type description (Simmons, l.c.) are reviewed here as aids in distinguishing *A. obtecta* from other large-spored euphorbiicolous taxa. These characters are a somewhat ladder-like pattern of transverse distoseptation evident in many conidia, and the obvious failure of eusepta to form across many of the distoseptum interfaces.

A "ladder" pattern of parallel transverse septa is seen best in long-ellipsoid conidia of *A. obtecta*, from young through mature spores; it may dominate the image even after longitudinal septa become visible. The "ladder rungs" initially, and often persistently, are simply the interfaces of adjacent transverse cells; true septa contiguous with the conidium wall are not observable at this stage.

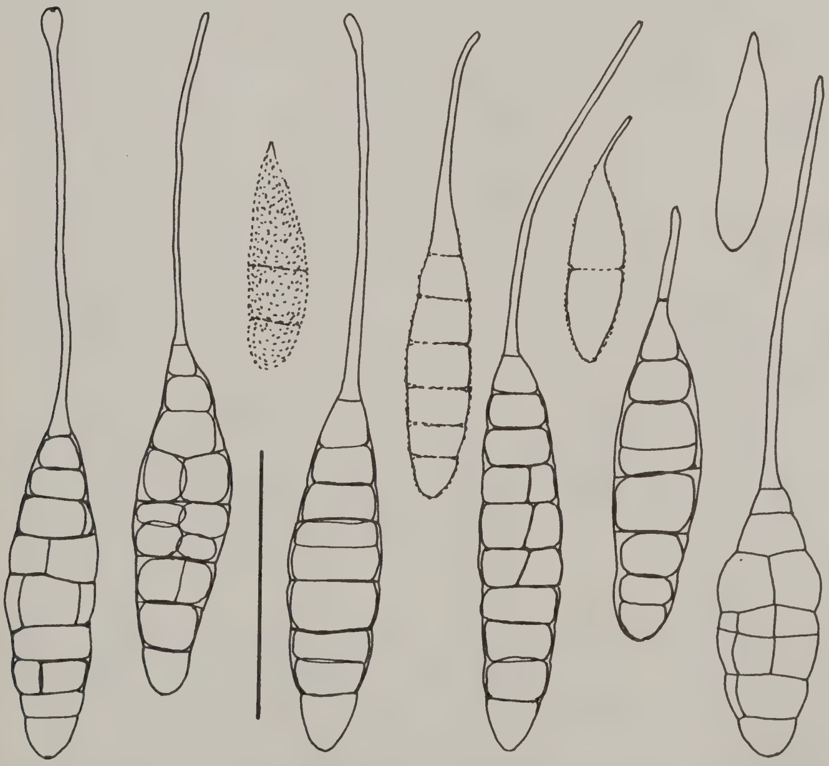


Fig. 126. *Alternaria obtecta*: conidia ex representative isolate EGS 42-064, ex PCA. Bar = 50μm.

True septa usually are produced across only a few of the interfaces as these initially distoseptate conidia mature. Other interfaces remain distoseptate, i.e., without interposed transverse eusepta, even in fully mature conidia.

The same progression is seen in formation of longitudinal septa. Initial, relatively indistinct longitudinal walls are interfaces that arise when broad tranverse cells divide into smaller rounded units. Sometimes longitudinal eusepta are generated through the distoseptum interface, but this progression to euseptation is by no means the rule throughout the *A. obtecta* conidium body.

* * * * *

The distoseptate—>euseptate progression in Alternaria

The conidia of many relatively large-spored taxa of *Alternaria* initially are distoseptate (conidia of "all" taxa is too strong a term for use at this stage of re-examination). Conidia of some taxa apparently progress to become totally euseptate. Others typically hover between the two conditions, even in cultures aged beyond routine 7-10 da.

Practically all illustrators of *Alternaria* conidia have neglected to mention this developmental character or to draw it, which simply means that large numbers of *Alternaria* illustrations (including mine) are misleading on the details of septum generation and mature appearance. The condition is illustrated in some units of these *Alt.T&V* notes, but without special comment until now. Examples, in addition to *A. obtecta* above, include *A. arbusti* Simmons (Simmons 1993b, Fig. 63), *A. cassiae* Jurair & Khan (Simmons 1982, Fig. 12-14), *A. citri* (Simmons 1990, Fig. 42), *A. dauci* (Simmons 1995, Fig. 119, and Fig. 127 herewith), *A. helianthinficiens* (Simmons 1986b, Fig. 30), *A. panax* Whetzel (Simmons 1982, Fig. 15), *A. protenta* (Simmons 1986b, Fig. 31), *A. tropica* (Simmons 1993a, Fig. 57), and *A. zinniae* (Simmons 1982, Fig. 10).

There is a dearth of published observations on the cytology of the distoseptate—>euseptate progression in *Alternaria*. The most extensive and instructive consideration of this developmental process resides in four papers by R. Campbell (1968, 1969, 1970a, 1970b), which are based on electron microscope studies of conidia of *A. brassicicola*. Campbell shows convincingly (1968, Pl. I, Fig. 3) that each of the several cells of the *A. brassicicola* conidium has its own wall of material quite distinct from that of the outer primary wall of the conidium.

At light microscope levels of magnification and definition, these neighboring secondary cell walls, plus non-cellular material that sometimes separates them, define what I refer to in *Alternaria* descriptions as distosepta and what I believe, in fact, matches the basic concept of the term distoseptation.

Non-cellular regions between individual cells and the outer wall of *Alternaria* conidia usually are conspicuous only where the rounded cell walls curve inward abruptly from their lateral contact with the outer spore wall. More strikingly, the individual conidial cells of some taxa—of *Alternaria* as well as some other genera—are embedded in a conspicuous "distoseptum matrix" (Simmons 1995, p. 139). Examples of this character include the anamorph of *Cochliobolus miyabeanus* (Ito & Kuribayashi) Drechsler (Matsui et al. 1962, fig. 1 & 5); *Bipolaris sorokiniana* (Sacc.) Shoemaker (Luttrell 1963, figs. 26-27); and all known species of *Nimbya* Simmons (Simmons 1989; 1995, pp. 139-149).

The euseptate condition in *Alternaria* (as seen at light microscope magnifications) arises through a process of insertion of an additional septum layer between the abutting distoseptum walls or through the non-cellular matrix that separates them. Campbell (1968) uses the term "septal partition" for this interposed layer, which appears to arise in and extend inwards from the outer conidium wall.

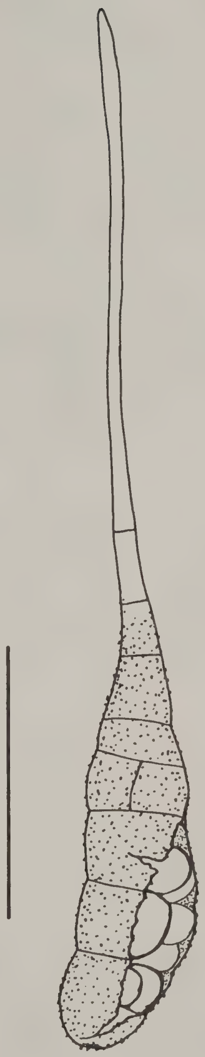


Fig. 127. *Alternaria dauci*: conidium with ruptured outer wall, revealing individual, intact, self-walled cells. Bar = 50μm.

The individual nature of *Alternaria* conidium cells, each within its own "distoseptum" wall, is emphasized by Campbell in a statement (1968, p. 389) that "each individual cell. . .separates from the other cells of the spore when the enclosing spore envelope [primary outer wall] is broken."

This structural phenomenon occasionally is observed, usually by chance, when the pressure of a cover slip has been great enough to break open a conidium outer wall but not great enough to crush its contents. The best example I have seen recently is in a preparation of conidia of *Alternaria dauci*, illustrated here in Fig. 127.

Conidia of *A. obtecta* (Fig. 126) show the ordinary steps from aseptation, to distoseptation, to partial euseptation and apparently, but rarely, to complete euseptation.

ACKNOWLEDGEMENTS

I remain grateful to Dr. Mary E. Palm for her patience and thoroughness in reviewing yet another in this series of *Alternaria* studies. Contributors of pertinent isolates over a time range of almost 40 years are thanked for their interest and support, specifically here: J. L. Alcorn, Wm. B. Cooke, H. L. Harvey, C. F. Hill, IMI, and C. T. Rogerson.

LITERATURE CITED

Campbell, R. 1968. An electron microscope study of spore structure and development in *Alternaria brassicicola*. Journ. Gen. Microbiol. 54: 381-392.

—— 1969. Further electron microscope studies of the conidium of *Alternaria brassicicola*. Arch. Mikrobiol. 69: 60-68.

—— 1970a. An electron microscope study of exogenously dormant spores, spore germination, hyphae and conidiophores of *Alternaria brassicicola*. New Phytologist 69: 287-293.

—— 1970b. Ultrastructure of an albino strain of *Alternaria brassicicola*. Trans. Brit. Mycol. Soc. 54: 309-312.

Luttrell, E. S. 1963. Taxonomic criteria in *Helminthosporium*. Mycologia 55: 643-674.

Matsui, C., M. Nozu, T. Kikumoto and M. Matsuura. 1962. Electron microscopy of conidial cell wall of *Cochliobolus miyabeanus*. Phytopathology 52: 717-718.

Simmons, E. G. 1982. *Alternaria* themes and variations (7-10). Mycotaxon 14: 17-43.

—— 1986a. Idem. (14-16). Mycotaxon 25: 195-202.

—— 1986b. Idem. (17-21). Mycotaxon 25: 203-216.

—— 1986c. Idem. (22-26). Mycotaxon 25: 287-308.

—— 1989. *Macrospora* Fuckel (Pleosporales) and related anamorphs. Sydowia 41: 314-329.

—— 1990. *Alternaria* themes and variations (27-53). Mycotaxon 37: 79-119.

—— 1993a. Idem. (54-62). Mycotaxon 46: 171-199.

—— 1993b. Idem. (63-72). Mycotaxon 48: 91-107.

—— 1994a. Idem. (74-105). Mycotaxon 50: 219-270.

—— 1994b. Idem. (106-111). Mycotaxon 50: 409-427.

—— 1995. Idem. (112-144). Mycotaxon 55: 55-163.

Simmons, E. G., and R. G. Roberts. 1993. *Alternaria* themes and variations (73). Mycotaxon 48: 109-140.

Yoshimura, M. A., J. Y. Uchida, and M. Aragaki. 1985. Etiology and control of *Alternaria* blight of poinsettia. Plant Dis. 70(1986): 73-75.

MYCOTAXON

Volume LVII, pp. 411-424 January-March 1996

NEW AND INTERESTING SPECIES OF *LACTARIUS* FROM MEXICO INCLUDING SCANNING ELECTRON MICROSCOPE OBSERVATIONS

Leticia Montoya, Victor M. Bandala and Gastón Guzmán
Instituto de Ecología, Apartado Postal 63
Xalapa, Veracruz 91000
Mexico

ABSTRACT

Lactarius salmoneus var. ***curtisii*** (Coker) Hesler & A. H. Sm., ***L. veraecrucis*** Sing. and ***L. volemus*** (Fr.) Fr. var. ***volemus*** are reported from new localities in Mexico, this latter also recorded from Guatemala. In addition ***L. chiapanensis*** is described as new species; it is an edible fungus occurring in a tropical forest at S Mexico.

INTRODUCTION

Among the Agaricales the genus ***Lactarius*** is one of the largest and relatively well known in temperate regions where it has been studied by several authors, i.e. Hesler & Smith (1979) in North America and Bon (1980) and Neuhoff (1956) in Europe. However, tropical species have been studied only by a few authors, as Singer (1975), Singer *et al.* (1983) and Pegler & Fiard (1978), who have studied some species from the neotropical region. The information on ***Lactarius*** from Mexico developed by Guevara *et al.* (1987), Montoya *et al.* (1990) and Montoya (1994), recorded several species from coniferous, *Quercus* and mesophytic forests most of them also reported in eastern United States and Canada. Members of the subgenus Plinthogalus (Burl.) Hesler & A.H. Sm. (1979), are common at the subtropical forests (mesophytic forests) in Mexico, but none had been collected from tropical forests. Recent collections of a member of this subgenus in a tropical region at S of the country (State of Chiapas) represent the first report of this subgenus in Mexican Tropics, and resulted to be a new species. In addition ***L. veraecrucis***, a tropical species in Mexico is reported from new localities, and other two unusual species of ***Lactarius*** that occur in mesophytic forests in the country are here recorded associated with ***Pinus*** at lowland areas one of which (***L. volemus*** var. ***volemus***) is also reported from Guatemala.

Colors in descriptions are based in Kornerup & Wanscher (1978). Microscopic observations were made on slides mounted in 5 % KOH and in Melzer's reagent. Range of spore ornamentation was measured by separate. Spores for scanning electron microscope (SEM), were obtained by superficially sticking gills on copper cylinders covered with double-faced celophane tape, samples were coated with a layer of gold-paladium. Microscopical study includes observations on types or authentic material.

A NEW SPECIES OF *LACTARIUS*

Lactarius chiapanensis Montoya, Bandala & Guzmán *sp. nov.*
Figs. 1-3, 17-18

Pileus 30-60 mm latus, brunneo, plano-convexus, disco demum depressus, velutinus, siccus. Lamellae adnexae-subdecurrentes, distantes, albae, brunnaceo se tingentes. Latex lacteus, albus. Stipes 10-30 x 10-15 mm, albus, glaber. Contextus albus, aromaticus. Sporae 8-8.8 x 6.4-7.2 ***µm****, subglobosae vel subellipsoideae, iodinos, verrucosae, non-reticulatae, verruculae 0.5* ***µ****m altae. Pleurocystidia 92-110.4 x 10.4-13.6* ***µ****m, cylindraceae, apicem mucronatae-sinuatae. Cheilocystidia 36-44 x 5.6-8* ***µm****, subcylindrico-claviformia. Ad terram in tropicalis sylvis sub Gymnopodium antigonoides. Region de Copoya, 5 km S Tuxtla Gutierrez, Chiapas, Mexico, Guzmán 29255 (Holotypus, XAL).*

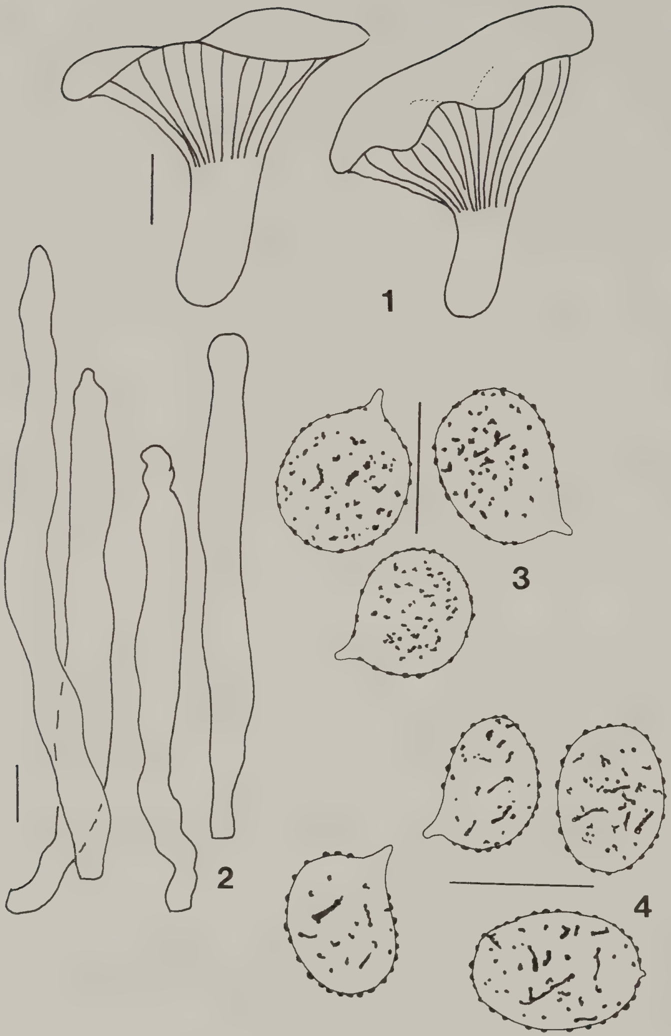
Pileus 30-60 mm in diam., plane-convex to infundibuliform, dry, subvelvety, dark brown (6F6) to pale greyish-brown (6C3-6D4) in mature specimens, cracky towards the margin and showing the white context. Lamellae distant, ± broad, thick, whitish to greyish, staining brown when cut, brittle, adnate to subdecurrent, with venations. Stipe 10-30 x 10-15 mm, greyish-white, staining brown when bruised, glabrous, brittle when dried. Latex white, staining cut surfaces and white paper brown. Context whitish, taste pleasant to faintly acrid.

Spores 8-8.8 x 6.4-7.2 *µ*m, subglobose to subelliptic, with amyloid ornamentation up to 0.5 *µ*m high, warted, at SEM the warts appear with obtuse apex, isolated and sometimes enlarged, occasionally interconnected, but neither forming a reticulum nor a pseudoreticulum, hyaline. Basidia 65.6-72 x 9.6-12 *µ*m, clavate, tetrasporic, sterigma 4-5.6 *µ*m length, hyaline. Pleurocystidia 92-110.4 x 10.4-13.6 *µ*m, subcylindric, at times somewhat ventricose, apex frequently mucronate, or acuminate to capitate, thin walled, yellowish, with refringent yellowish content, arising from the trama. Cheilocystidia absent or only basidiole-like elements 36-44 x 5.6-8 *µ*m, subclavate to subcylindric, hyaline to yellowish. Pseudocystidia 2.4-3.2 *µ*m broad, subcylindric, ± vermiform, sinuous, yellowish. Pileus cuticle hymeniform, pileocystidia 24-48 x 5.6-12 *µ*m, subcylindric, subclavate or subcapitate, with yellowish-brown content, hypodermium composed of sphaerocysts 5.6-16 *µ*m in diam., wall up to 1.6 *µ*m thick, honey-brown. Context hyphae 4-5.6 *µ*m, lactifers 4-11.2 *µ*m broad, sphaerocysts 8-24 *µ*m broad, hyaline to yellowish. Hymenial trama hyphae 4-4.8 *µ*m, hyaline, thin walled; lactifers 4-8 *µ*m broad, hyaline to yellowish, thin walled. Clamp connections absent.

Habitat. Terricolous, gregarious, in a tropical forest associated with *Gymnopodium antigonoides* Blake (Polygonaceae) (‘nangaño’, ‘nangaña’ or ‘aguana’). Collected during June to September.

Studied specimens. **MEXICO. Chiapas**: Región de Copoya, 5 km S Tuxtla Gutiérrez, **Guzmán 29255 (holotype)**, **Montoya 3134** (both at XAL). Tuxtla Gutiérrez market, **Palacios 1264** (CHIP; XAL).

Discussion. This is a member of subgenus Plinthogalus (Burl.) Hesler & A. H. Sm. (1979) according to basidiomes color,



Figs. 1-4.- 1-3: ***L. chiapanensis*** 1: basidiomes, 2: pleurocystidia, 3: spores (type). 4: ***L. pseudogerardii*** spores (Poter 12897). Scale bar: 1 = 10 mm, 2-4= 10 μm.

the structure of pileus cuticle and white latex. ***L. chiapanensis*** can be distinguished in this subgenus by the tropical habitat and morphologically by spores ornamentation, which at times resembles those of ***L. petersenii*** Hesler & A. H. Sm. and ***L. pseudogerardii*** Hesler & A. H. Sm. However, both species grow at deciduous forests at U.S.A., the former has basidiomes with closer lamellae, brown latex and spores 7.5-10 x 6-8 μm (Hesler & Smith, 1979), while in the latter, according to the observations on the type (U.S.A.: Michigan, Edgewood, **Poter 12897**, MICH) do not present cystidia and has more ellipsoid and bigger spores (9.6-)10.4-12 (-13.6) x 7.2-8(-8.8) μm (figs. 4 & 19) and as observed at SEM, with more frequent interconnecting bands. Other species in this subgenus distributed in the Neotropical Region are ***L. costaricensis*** Singer and ***L. gigasporus*** Singer, (Singer *et al.*, 1983). Both species however differ by latex staining red on context, in ***L. costaricensis*** spores are bigger (9.5-12 x 8.5-10.5 μm) with reticulum made up of ridges and fine connecting bands and clamp connections presence. ***L. gigasporus*** also presents bigger spores 10-11 x 9.8-11 μm, with a coarse reticulum, projecting 2-3.3 μm.

L. chiapanensis is an edible fungus known in Zoque lenguage as 'moní' (mushroom) and along with other macrofungi are sold at popular markets at Tuxtla Gutiérrez and adjacent areas. This species is the unidentified mushroom cited by Miranda (1953) as 'moní' '...an edible agaric, frequent at aguacatonales and very popular at Tuxtla Gutiérrez region'. ***L. chiapanensis*** probably stablish mycorrhizal associations at this kind of vegetation where ***Gymnopodium antigonoides*** Blake dominates; the aguacatonales prosper as secondary vegetation and are more or less common in Chiapas and Yucatan (Rzedowski, 1978).

NEW COLLECTIONS OF *LACTARIUS* FROM MEXICO AND ONE FROM GUATEMALA

Lactarius salmoneus var. ***curtisii*** (Coker) Hesler & A. H. Sm., *North American Species of Lactarius*, p. 72, 1979

Figs. 5-6, 21

This fungus is characterized by short to medium size basidiomes (pileus up to 60 mm in diam.), conspicuously covered by a whitish pubescence on an orange-cream (5A3) ground and the invariable orange latex staining green (4C3-4B3) the cut or bruised surfaces. The spores are 6.4-8 x 5.6-6.4 μm, partially reticulate, ornamentation less than 0.5 μm high, at SEM the ornamentation is observed made up of ± continuous bands with projections and isolated warts and with a suprahilar plage, apiculus 0.8 μm length. Macrochemical reactions observed: $FeSO_4$ pale blue (20B2) on context, H_2SO_4 black on context, NH_4OH and fenol negative.

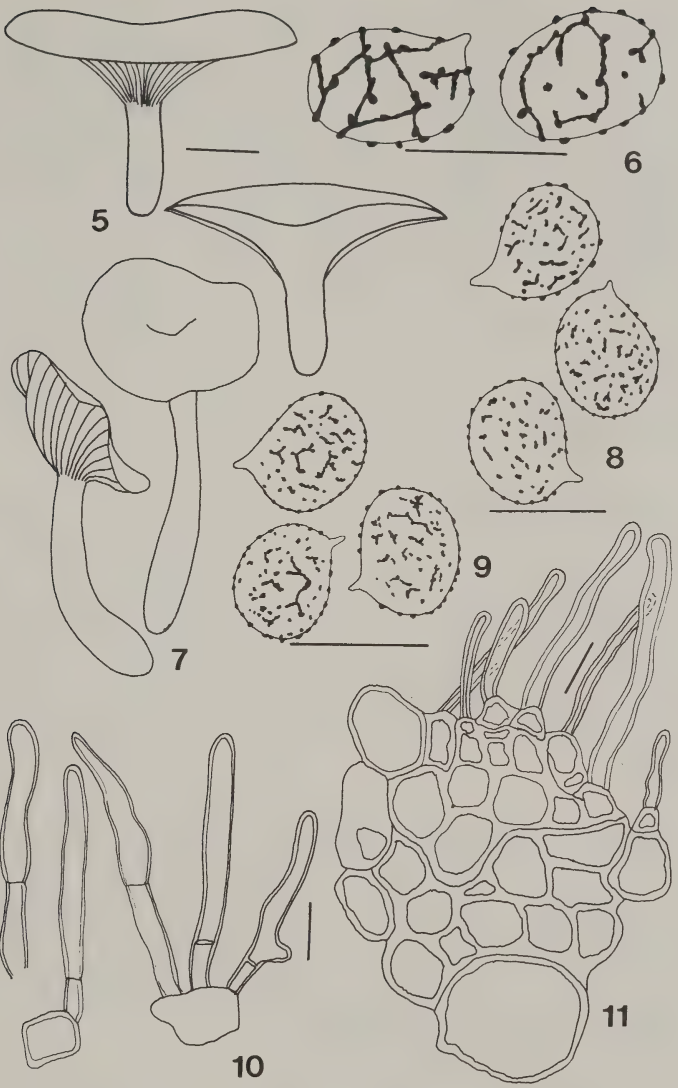
This species was reported and described from Guerrero by Cifuentes *et al.* (1989), and in the present contribution is recorded from **Oaxaca** (road Coatzacoalcos to Tehuantepec, 5 km NE Matías Romero, *Pinus* forest, **Guzmán 16061**, ENCB; XAL). Also the material considered by Cifuentes *et al.* (1989) (**Guerrero**: **Ramírez s.n.**, Jul., 1982, *Pinus-Quercus* forest, FCME; XAL) was studied.

It is interesting to note that this species grows at lowland forests in Mexico; the collections were found at 250 m and 950-1000 m altitude in Oaxaca and Guerrero respectively, which shows its peculiar distribution in association with conifers related to tropical regions. Hesler & Smith (1979) reported ***L. salmoneus*** var. ***curtisii*** associated to pine-hardwoods in low-lying areas from Tennessee and North Carolina and considered that this variety is to be expected throughout the pine belt of the SE U.S.A., an interesting area where the northern and southern floras overlap and according with Guzmán (1973) has biogeographical relationships with deciduous and tropical forests from Mexico.

Lactarius veraecrucis Singer, Sydowia Beih. 7: 104, 1973

Figs. 7-11, 20

Basidiomes of this species are characterized by pileus 25-45 mm in diam., orange to yellowish-orange (6A7-5A7), subdistant lamellae which stain yellowish-orange (5A4) to cream-yellowish, and white invariable latex. It was fully described by Singer (1975), and now additional microscopical observations are provided, including the study of type materials. Spores (6.4-)7.2-8(-8.8) x



Figs. 5-11.- 5-6: ***L. salmoneus*** var. ***curtisii*** 5: basidiomes, 6: spores (Guzmán 16061). 7-11: ***L. veraecrucis***, 7: basidiomes, 8-9: spores, 10: epicutis elements, 11: epicutis (7, 9-10: MEXU 7044, 9, 11: Singer M-8025). Scale bar: 5 = 10 mm; 6, 8, 9 = 8 *μ*m; 7: = 13 mm; 10-11 = 10 *μ*m.

(5.6-)6.4-7.2 µm, subglobose to subellipsoid, ornamentation less than 0.5 µm high, amyloid, finely punctate to verrucose, at times with fine connective bands, not forming a reticulum, at SEM the ornamentation appears made up of isolated warts, some connected by bands and showing incomplete reticulations. Cheilocystidia 32-48 x 3.2-4 µm, subcylindric, subfusiform, thin walled. Epicutis with pileocystidia 20-44(-56) x 2.4-5.6 µm, walls 0.8-1.6(-3.2) µm thick, subcylindric, subclaviform, subfusiform, hypodermium composed of sphaerocysts 8-20(-24) µm wide, walls 0.8(-1.6) µm thick. Context hyphae 4-12 µm diam., hyaline to yellowish, thin-walled, sphaerocysts 8-22 µm in diam., walls up to 1.6 µm thick, yellowish-green. Hymenial trama hyphae 3.2-6.4 µm in diam., yellowish, lactifers 5.6-8.8 µm, sphaerocysts 8-10.4 µm wide, yellowish, walls up to 1.6 µm thick, yellowish. Clamp connections absent.

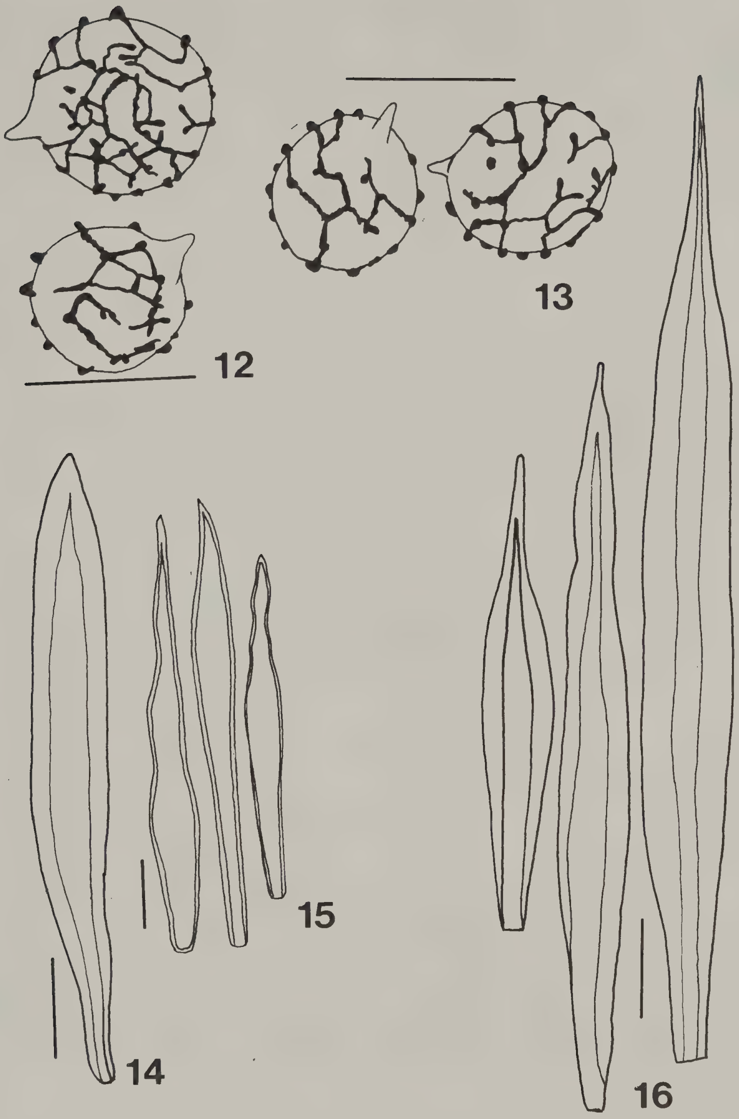
The species was known from tropical rain forests of Mexico (Guzmán, 1977) and from Veracruz and Hidalgo (Singer, 1975; Varela & Cifuentes, 1979, respectively) although Varela & Cifuentes (1979) cited this species from a ***Pinus-Quercus*** forest. Specimens here studied proceede from a new locality at Veracruz and new records from Chiapas and Jalisco are also included. ***L. veraecrucis*** grows solitary in a tropical rain forest at Veracruz and Chiapas and in a tropical deciduous forest at Jalisco, during June-July and October.

Studied specimens. MEXICO. Chiapas: Municipio de Ocosingo, Camino Lacanja-Río Cedro, **Chacón 1978** (XAL). **Jalisco**: Estación Biológica Chamela, UNAM, **Martínez & Cervantes s.n.** (MEXU 19057). **Veracruz**: Municipio de Catemaco, Estación Biológica Los Tuxtlas, **Singer M-8025** (isotype, ENCB); **Herrera s.n.** (topotype, MEXU 7044); Municipio de Catemaco, Ejido López Mateos, **Chacón 3975** (XAL).

Lactarius volemus (Fr.) Fr., *Epicr. Syst. Mycol.* p. 344, 1848 var. ***volemus***

Figs. 12-16, 22

Pileus 20-95 mm diam., convex to plane-convex or depressed, incurved, subvelvety, dry, dark yellowish-orange to light



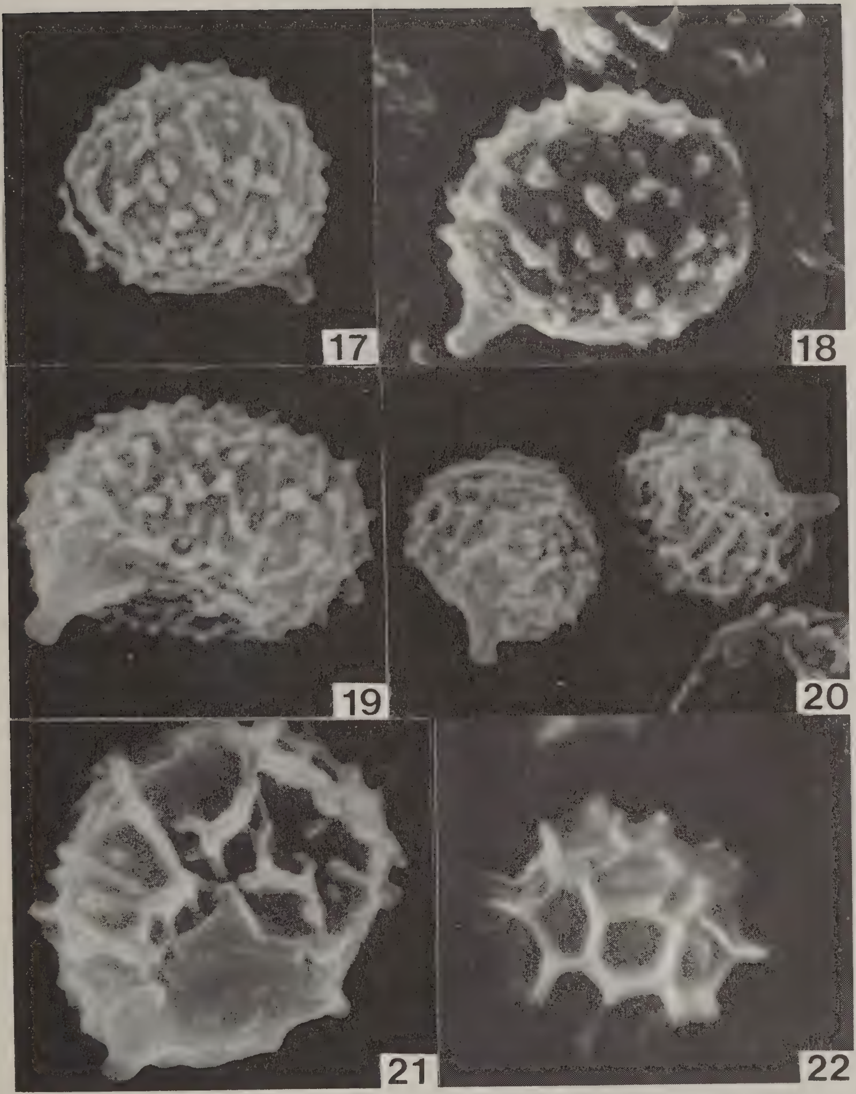
Figs. 12-16.- ***L. volemus***, 12-13: spores (12: Shaffer 6194: 13: Brown 424). 14, 16: pleurocystidia (14: Shaffer 6194; 16: Brown 424), 15: cheilocystidia (Shaffer 6194). Scale bar: 12, 14-16 = 10 μm, 13 = 8 μm.

honey-yellowish (4A6,5A7, 5C8, 6C7-6C8). Lamellae adnexed to subdecurrent, close, ± broad, yellowish-cream to yellowish-orange, staining brown when bruised. Stipe 30-80 x 5-25 mm, cylindric, velvety, dry, light yellowish-orange to orange-brown (5A6-5C8), rugose. Context whitish-buff, odor slight, taste mild to slightly astringent. Latex white, invariable, only staining brown the cut surfaces, after some minutes staining white paper brown. KOH stains orange on latex, greenish on pileus; fenol vinaceous on pileus, context and latex.

Spores (6.4-)7.2-8.8(-9.6) x (5.6-)7.2-8(-8.8) μm, subglobose, hyaline, apiculus 2.4 μm length, reticulum amyloid, coarse, 0.8 μm high and with conspicuous projections, up to 1.2 μm high, at SEM the reticulum appears forming polygonal, mostly pentagonal chambers. Basidia 40-62.4 x 7.2-10.4 μm, clavate, hyaline, tetrasporic. Pleurocystidia 60-112 x 8-10.4 μm, wall 1.6-4.8 μm thick, ventricose-subfusiform, lanceolate, sinuous, subfusiform, yellowish, numerous. Cheilocystidia 24-64(-78) x 4-6.4(-0.8) μm, subfusiform, at times sinuous, wall (1.6-)2.4 μm thick, yellowish, abundant. Epicutis a trichodermis, hypodermium with sphaerocysts 8-24 μm in diam., broader towards subyacent layers, walls up to 1.6 μm thick, yellowish, pileocystidia 12-52 x 3.2-5.6 μm, walls 1.6-2.4 (-3.2) μm thick, yellowish. Context hyphae 3.2-5.6 μm broad, lactifers 3.2-5.6 μm broad, sphaerocysts 3.2-24 μm in diam., yellowish. Hymenial trama hyphae 4-5.6 μm, hyaline, lactifers 4-6.4 μm, hyaline to yellowish. Clamp connections absent.

Habitat. Terricolous, subgregarious, at ***Pinus-Quercus*** forests and mesophytic forests, associated with ***Quercus***. Collected from May to September and in November.

Studied specimens. **U.S.A**. **North Carolina**: Swain Co., **Shaffer 6194** (MICH). **GUATEMALA. Quiche**: Cerro de Pascual Abaj, Chichicastenango, **Guzmán G-1** (XAL). **MEXICO**. **Jalisco**: Municipio de Tapalpa, Sierra de Talpa, 5 km W Las Piedrotas, **Guzmán-Dávalos 5360** (IBUG; XAL). 5 miles NNE of Talpa de Allende, **Mc Vaugh 364** (MICH). **Michoacan**: Municipio de Charo, Parque Nacional Insurgente José Ma. Morelos **Guzmán-Ontiveros s.n.**, Jul. 29, 1983 (FCME; XAL), **Padilla s.n.**, Aug. 19, 1983; 219-220 km road Morelia-Toluca, Pontezuelas, **Cifuentes 747** (both at



Figs. 17-22.- 17-18: ***L. chiapanensis*** (type, 17: 5000 x; 18: 7500 x). 19: ***L pseudogerardii*** (Poter 12897, type, 5000 x). 20: ***L. veraecrucis*** (MEXU 7044, 5000 x). 21: ***L. salmoneus*** var. ***curtisii*** (Guzmán 16061, 5000 x). 22: ***L. volemus*** (Brown 126, 7500 x).

FCME). **Tamaulipas**: Road Gómez Farias-Rancho El Cielo, **Guevara s.n.**, May 28, 1985 (ITCV; XAL). **Veracruz**: 2.5 km old road Xalapa-Coatepec, near Casa Asistencial CONECALLI-DIF, **Montoya 1901**; **Murrieta 58**; Parque Ecológico Fco. J. Clavijero, 2.5 km old road Xalapa-Coatepec, **Anell 441**; **482**; **Chacón 2890**; **Brown 126; 270**; **272**; **424** (all at XAL). 2 km SW Xalapa, near Río Coapexpan, **Bandala 1332**; **1358**; **2116**; **Guzmán 29142** (all at XAL).

Discussion. In Mexico this species was cited by Guzmán (1977), Varela & Cifuentes (1979), Frutis & Guzmán (1983), Garza *et al.* (1985), Díaz-Barriga *et al.* (1988) and Laferriere & Gilbertson (1992). Now is recorded for the first time from the States of Jalisco, Tamaulipas and Veracruz, and from Guatemala. It is characterized by size and color of the basidiomes and by spores size and ornamentation. The spores ornamentation agree with the observations at SEM by Lalli & Pacioni (1992), Homola & Kimball (1975) and Homola & Weber (1979).

L. volemus can often be mistaken with ***L. corrugis*** although basidiomes of the later are more robust and in lighter colors, rugose pileus and bigger spores (8-)10.4-12.8(-13.6) x (8-)9.6-11.8(-12.8) μm, with a coarser reticulum and ± conspicuous projections, according to SEM observations in type (***L. corrugis***, U.S.A.: New York, Sand Lake and Gansevort, Peck s.n., at NYS).

ACKNOWLEDGEMENTS

The authors appreciate the support given by Instituto de Ecologia and SNI to their researches. They acknowledge to R.L. Shaffer and P. Rogers (MICH) by the loan of types or materials studied by Hesler and Smith. Likewise, J. Cifuentes (FCME), L. Guzmán-Dávalos (IBUG), J. García (ITCV), J.H. Haines (NYS) and E. Pérez-Silva and E. Aguirre-Acosta (MEXU) provided several materials included in this paper. They also express their thanks to Dr. Joaquín Cifuentes at Facultad de Ciencias, UNAM by the critical revision to this paper, his comments, substantially improved it. Biól. Eduardo Palacios at Instituto de Historia Natural at Chiapas kindly gave information on the new species here described, which is also appreciated.

LITERATURE CITED

Bon, M., 1980. Clé monographique du genre *Lactarius* (Pers.: Fr.) S.F. Gray. *Doc. Myc. 10:* 1-85.

Cifuentes, J., L. Pérez-Ramírez and M. Villegas, 1989. Descripción de macromicetos poco estudiados de México III. *Rev. Mex. Mic. 5*: 101-115.

Díaz-Barriga, H., F. Guevara-Fefer and R. Valenzuela, 1988. Contribución al conocimiento de los macromicetos del Estado de Michoacán. *Acta Bot. Mex. 2*: 21-44.

Frutis, I. and G. Guzmán, 1983. Contribución al conocimiento de los hongos del Estado de Hidalgo. *Bol. Soc. Mex. Mic. 18*: 219-265.

Garza, F., J. García and J. Castillo, 1985. Macromicetos asociados al bosque de *Quercus rhyzophylla* en algunas localidades del centro del Estado de Nuevo León. *Rev. Mex. Mic. 1*: 423-437.

Guevara, G., J. García, J. Castillo and O.K. Miller, 1987. New records of *Lactarius* in Mexico. *Mycotaxon 30*: 157-176.

Guzmán, G., 1973. Some distributional relationships between Mexican and United States mycofloras. *Mycologia 45*: 1319-1330.

Guzmán, G., 1977. *Identificación de los hongos*. Ed. Limusa, Mexico City.

Hesler, L. R. and A. H. Smith, 1979. *North American Species of Lactarius*. Univ. Michigan Press, Ann Arbor.

Homola, R. y J. Kimball, 1975. Scanning electron microscopy of spore ornamentation in the genus ***Lactarius***. The *Botanist 14*: 179.

Homola, R. and N. Weber, 1979. Scanning electron-microscope studies of *Lactarius* spore ornamentation. In: Hesler, L. R. and A.H. Smith. *North American species of Lactarius*. University of Michigan, Ann Arbor.

Kornerup, A. and J. H. Wanscher, 1978. *Methuen handbook of colour*. Methuen, London.

Laferriere, J., E. and R. L. Gilbertson, 1992. Fungi of Nabogame, Chihuahua, Mexico. *Mycotaxon 44:* 73-87.

Lalli, G. and G. Pacioni, 1992. *Lactarius* sct. Lactifluus and allied species. *Mycotaxon 44*: 155-195.

Miranda, F., 1953. *La Vegetación de Chiapas* (Segunda parte). Gobierno del Estado de Chiapas, Tuxtla Gutiérrez.

Montoya, B. L., 1994. Las especies de *Lactarius* (Fungi, Basidiomycotina) conocidas en México, Contribución al estudio monográfico del género. Master Thesis, UNAM, Mexico, D.F.

Montoya, B. L., G. Guzmán and V. M. Bandala, 1990. New records of *Lactarius* from Mexico and discussion of the known species. *Mycotaxon 38*: 349-395.

Neuhoff, W., 1956. *Die Milchlinge.* Verlag, Heilbrunn.

Pegler, D.N. and J.P. Fiard, 1978. Taxonomy and Ecology of *Lactarius* (Agaricales) in the Lesser Antilles. *Kew Bull. 33:* 601-628.

Rzedowski, J., 1978. *Vegetación de México*. Limusa, Mexico, City.

Singer, R., 1975. Tropical Russulaceae: *Lactarius* sect. Polysphaerophorini in the Gulf area. *Nova Hedwigia 26*: 897-901.

Singer, R., I. Araujo and M. H. Ivory, 1983. *The ectotrophycally mycorrhizal fungi of the neotropical lowlands, especially Central Amazonia.* Cramer, Vaduz.

Varela, L. and J. Cifuentes, 1979. Distribución de algunos macromicetos en el norte del Estado de Hidalgo. *Bol. Soc. Mex. Mic. 13:* 75-88.

MYCOTAXON

Volume LVII, pp. 425-450 January-March 1996

ADDITIONAL NEW RECORDS ON *LACTARIUS* FROM MEXICO

LETICIA MONTOYA AND VICTOR M. BANDALA
Instituto de Ecología, Apartado Postal 63
Xalapa, Veracruz 91000
Mexico

ABSTRACT

Observations of the basidiospores under SEM, as well as new data and critical notes concerning the taxonomy and distribution of **Lactarius alnicola** A. H. Sm. var. ***alnicola***, ***L. corrugis*** Peck, ***L. deceptivus*** Peck, ***L. indigo*** (Schw.) Fr., ***L. griseus*** Peck, ***L. resimus*** (Fr.) Fr. var. ***resimus***, ***L. resimus*** var. ***regalis*** Peck and ***L. subpalustris*** Hesler & A. H. Sm. are presented. The three latter species are reported for first time from Mexican mycobiota.

INTRODUCTION

Since the contributions by Gándara (1929-1931), Herrera & Guzmán (1961) and Guzmán (1977) about 50 species of ***Lactarius*** have been recorded from Mexico (Montoya *et al.* 1990), although most taxa are cited only in regional checklists without descriptions and commonly without materials of reference. According to this, Montoya (1994) discussed that about 20 species previously reported from the country correspond to other taxa in the genus, or its status remain doubtful, since no material with enough information were deposited at Mexican Herbaria, nor at present fresh specimens to corroborate the determinations have been collected. The contributions adscribed to the knowledge of the genus in Mexico are the studies by Guevara *et al.* (1987), Montoya *et al.* (1990), Montoya (1994) and Kong-Luz & Estrada-Torres (1994).

The present paper is a new advance towards the monographic study of the genus in Mexico, which the authors are developing. In this contribution the description of three new records and reports at new localities of other four species in Mexico are presented, based in the revision of about 118 specimens deposited at ARIZ, ENCB, FCME, IBUG, ITCV, MICH, NYS TLXM and XAL, including 2 types. Measurement of spores and ornamentation were considered separatedly, colors of microcharacters in the descriptions were observed in 5% KOH and those of macrocharacteres are based in the code of Kornerup & Wanscher (1978). Pattern of spores ornamentation was observed on slides mounted in Melzer's solution and at scanning electron microscope (SEM) (JEOL mod. JSM-T20). Gills samples for the observations and photographs of the spores at SEM were dehydrated in absolute alcohol and mounted by contacting double faced celophane tape on copper stubs. Spores were coated with a layer of gold-paladium and processed in a fine coat ion sputter JEOL mod. JFC-1100.

NEW RECORDS OF *LACTARIUS* FROM MEXICO

Lactarius griseus Peck, *Ann. Rep. N. Y. State Cab. 23*: 120, 1872
Figs. 1-3

Pileus 20-35 mm diam., convex to plano-convex, depressed, at times with an acute papilla, greyish-violaceous (10D3-10D2) to greyish-brown (8D2-7C3), granulose, dry. Lamellae subdecurrent, ± closed, concolorous to the pileus. Stipe 30-50 x 4-5 mm, concolorous with pileus, dry. Context whitish, odor mild, taste not recorded. Latex white, invariable.

Spores (6.4-)7.2-8 x 6.4-7.2(-8) μm, subellipsoid, with isolated conic warts up to 1.2 μm high, occasionally connected by fine lines, apiculus up to 1.6 μm length, hyaline to yellowish, but with amyloid ornamentation, at SEM some pronounced ridges are observed. Basidia 48-52 x 5.6-8.8 μm, subclavate, tetrasporic, sterigma up to 6.4 μm length, hyaline. Pleurocystidia 56-60 x 9.6-10.4 μm, subfusiform, with an enlarged apex or sometimes constricted, hyaline, rare. Cheilocystidia 18.4-40 x 4.8-6.4 μm, subclavate to subfusiform, hyaline. Epicutis hyphae 3.2-4.8 µm broad, ± postrate, other projected in fascicles, yellowish. Context hyphae 3.2-4 µm broad, sphaerocysts 6.4-16 µm diam., yellowish, irregular. Hymenial trama with lactifers 2.4-6.4 µm broad, honey-yellow. Clamp connections absent.

Habitat. Basidiomes on a piece of wood on the ground, solitary in subtropical forest (mesophytic forest) with *Quercus* spp., *Alnus jorullensis* H.B. & K., *Carpinus carolineana* Walter, *Ostrya virgineana* (Miller) K. Koch, *Liquidambar macrophylla* Oerstec. Collected on July.

Studied specimen. **MEXICO. Veracruz**: Huatusco region, I Mushroom Exposition at INIREB (Xalapa), **Guzmán 23214** (XAL).

Discussion. This is the first report of the species from Mexico. It is distinguished by its basidiomes color, both size and ornamentation of the spores and by the lignicolous habitat. Hesler & Smith (1979) recorded the species growing on decaying logs, humus and at times on mosses and reported it from Eastern U.S.A. and Canada. Distribution observed by these authors and the founding in subtropical forest from Eastern Mexico agree with mycofloristic relationships pointed out by Guzmán (1973).

Lactarius resimus (Fr.) Fr. *Epicr. Syst. Mycol.* p. 336, 1838 var. ***resimus***

Figs. 4-6, 43

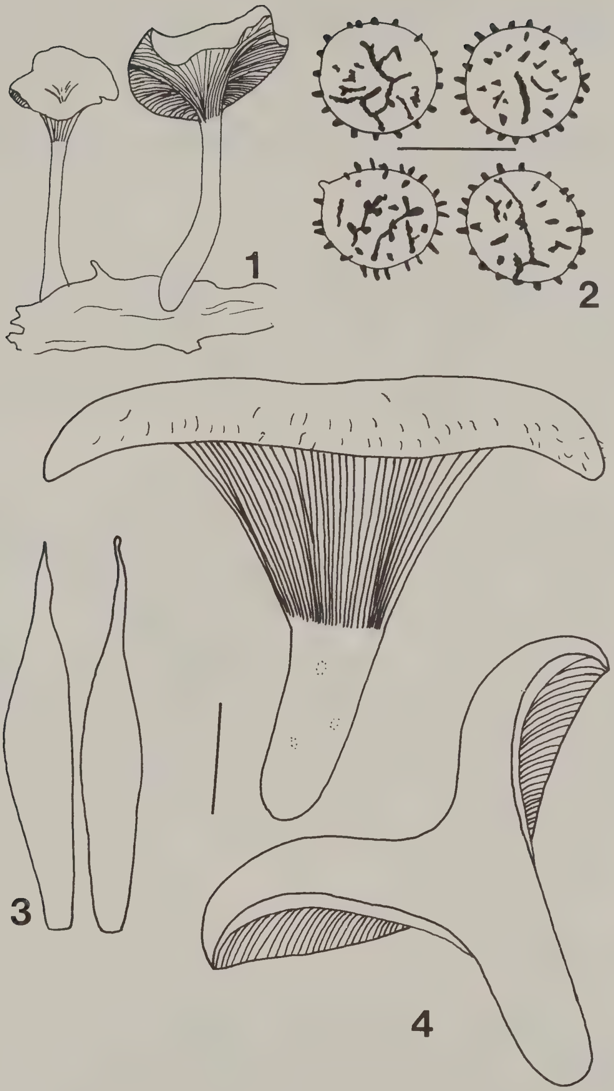
Pileus 65-150 mm diam., convex to subinfundibuliform, hygrophanous, glabrous, only finely imbricate or sometimes loosely fibrillose at margin, obscurely concentric zonations present, whitish to cream-buff, darker towards the center, margin incurved. Lamellae adnate to decurrent, closed, ± broad, cream-whitish to yellowish, with pale brown stains. Stipe 20-50 x 15-31 mm, cylindric, rounded towards the base, whitish to cream-whitish, stained with brownish tinges at maturity, glabrous, at times obscurely areolate. Context cream-whitish, odor pleasant, taste acrid. Latex white, staining sulphur yellow (3A4-3B4). NH_4OH negative; KOH pale orange-brown (7C6) on pileus, yellow (4A6) on context, instantaneously dark orange (7A8) on latex; $FeSO_4$ slightly bluish (20B2) on pileus after some minutes.

Spores 6.4-8(-8.8) x (4.8-)5.6-6.4 µm, subellipsoid to subellipsoid-globose, with a ± complete reticulum, ornamentation 0.5(-0.8) µm high, apiculus 1.6 µm length, hyaline, with amyloid ornamentation, at SEM some unconnected bands and isolated warts are observed. Basidia 41.6-48 x 8-8.8 µm, clavate, hyaline, tetrasporic, sterigma 3.2-5.6 µm length. Pseudocystidia sinuous 4-5.6 µm broad, hyaline. Pleurocystidia 56-64 x 6.4-8 µm, subfusiform-sinuous, sometimes constricted at apex, with abundant refringent content, yellowish-green, rare, more common towards the lamellae origin. Pileus cuticle a thick ixocutis, hyphae 2.4-4 µm broad, hyaline to greenish. Context hyphae 3.2-7.2 µm broad, sphaerocysts 12-28 µm diam., numerous, yellowish. Clamp connections absent.

Habitat. Terricolous, solitary to subgregarious, at *Pinus-Quercus* (*P. ayacahuite* Ehrenb., *P. lutea* Lodd ex Gord., *P. engelmanii* Carr. and *Quercus* spp.) and *Pinus* (*P. teocote* Schlecht. & Cham., *P. montezumae* Lambert) forests. Collected during July-September.

Studied specimens. **MEXICO. Durango**: Municipio de Pueblo Nuevo, El Mil Diez, **Guevara s.n.** (Sept. 2, 1983) (ITCV; XAL); **Guerrero**: Municipio de Tixtla de Guerrero, 29 km road Chilpancingo-Tlapa, **Hernández, s.n.** (Sept. 23, 1981) (FCME). **Veracruz**: Municipio de Sierra de Agua, 40 km road Xalapa-Perote, near Colonia 20 de noviembre, **Montoya 1369-A** (XAL).

Discussion. The outstanding characters of this species are basidiomes color, as well as both ornamentation and size of the spores. Mexican materials agree with the concept of the species by Hesler & Smith (1979) and Homola & Weber (1979). ***L. resimus*** var. ***regalis*** also discussed in this paper differs in spores size. Neuhoff (1956) described ***L. resimus*** with white basidiomes stained yellow when bruised and spores 7-9 x 5.5-7 µm, and Bon (1980) under ***L. resimus*** ss. str. auct., Nh., etc. described pileus white or cream, ± yellowish, stipe not scrobiculate or ± spotted and spores



Figs. 1-4.- 1-3: ***L. griseus***, 1: basidiomata, 2: spores, 3: pleurocystidia (Guzmán 23214). 4: ***L. resimus*** var. ***resimus***, basidiomata (Montoya 1369-A). Scale bar: 1 = 18 mm; 2-3 = 8 μm; 4 = 20 mm.

7.5-10 x 6-6.5 µm. Laferriere & Gilbertson (1992) reported ***L. resimus*** from Chihuahua also not indicating infrageneric status.

Lactarius resimus var. ***regalis*** Peck, *Ann. Rep. N. Y. State Mus. 38:* 118, 1873.

Figs. 7-9

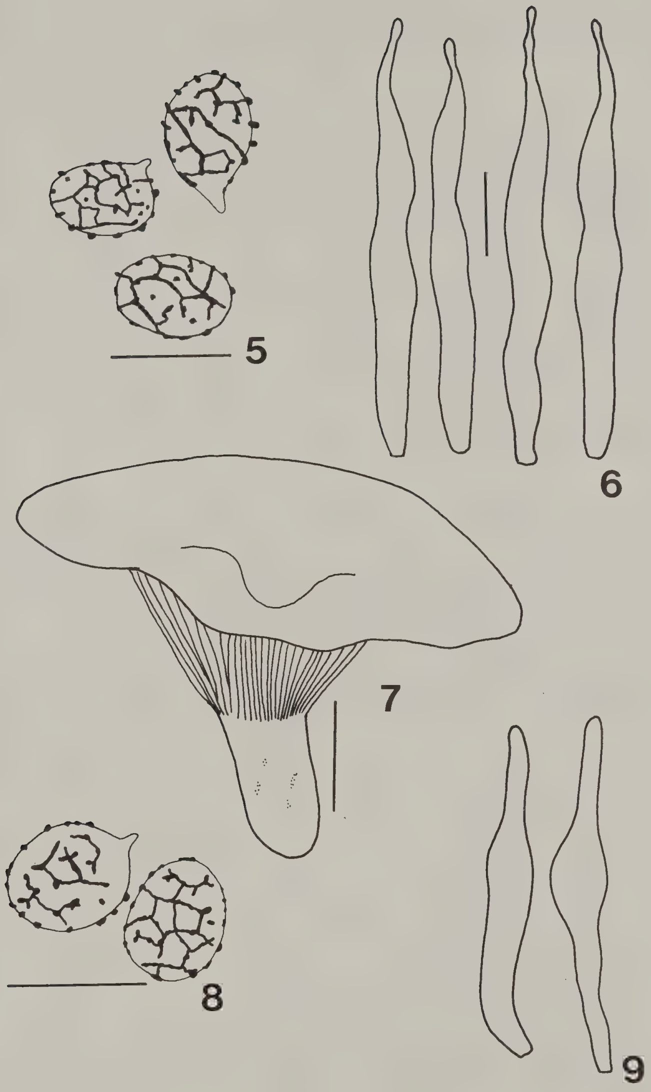
Pileus 70-110 mm diam., infundibuliform, whitish with yellowish-orange tinges (5A3) at maturity, margin incurved, smooth, viscid. Lamellae, white, adnexed to subdecurrent, closed. Stipe 20-30 x 15-25 mm, subcylindric, whitish, spotted. Context white. Latex white, immediately staining yellowish-green (3A4-3B4) when exposed.

Spores 7.2-9.6 x (5.6-)6.4-7.2 µm, subellipsoid-globose, reticulum ± complete, up to 0.8 µm high, apiculus not oblicuous, hyaline, but with amyloid ornamentation. Basidia 40-52 x 8-8.8 µm, clavate, hyaline, tetrasporic, sterigma 3.2-4.8 µm length. Pleurocystidia 60-72 x 8-12 µm, sinuous at times ventricose or lageniform with refringent content, hyaline, rare. Epicutis an ixocutis, hyphae 2.4-4 µm broad, hyaline to yellowish. Context with sphaerocysts 6.4-24 µm diam., walls 1.6-2.4 µm thick, hyaline to yellowish, hyphae 4-9 µm broad, hyaline, lactifers 6-12 µm broad, honey-yellowish. Hymenial trama irregular, hyphae 4-12 µm broad, hyaline, lactifers 4-9 µm broad, yellowish, refringent. Clamp connections absent.

Habitat. Terricolous, solitary, at *Pinus-Abies* forest. Collected on September.

Studied specimens. **MEXICO**. **Estado de Mexico**: Zoquiapan, Llano grande, **Padilla-García 10-Z** (FCME). **U.S.A. Michigan**: Cheboygan Co., **Smith 58275** (MICH).

Discussion. As indicated by Hesler & Smith (1979), var. ***regalis*** differs of var. ***resimus*** by its bigger spores. Mexican specimens share similar size of spores with the collection from Michigan, but more collections of this variant are required to support the differences between both taxa.



Figs. 5-9.- 5-6: ***L. resimus*** var. ***resimus***, 5: spores, 6: pleurocystidia (Guevara s. n., Sept./1983). 7-9: ***L. resimus*** var. ***regalis***, 7: basidiomata, 8: spores (Padilla-García 10-Z), 9: pleurocystidia, (Smith 58275). Scale bar: 5 = 8 *μ*m; 6, 8 = 10 *μ*m; 7 = 20 mm; 9 = 20 *μ*m.

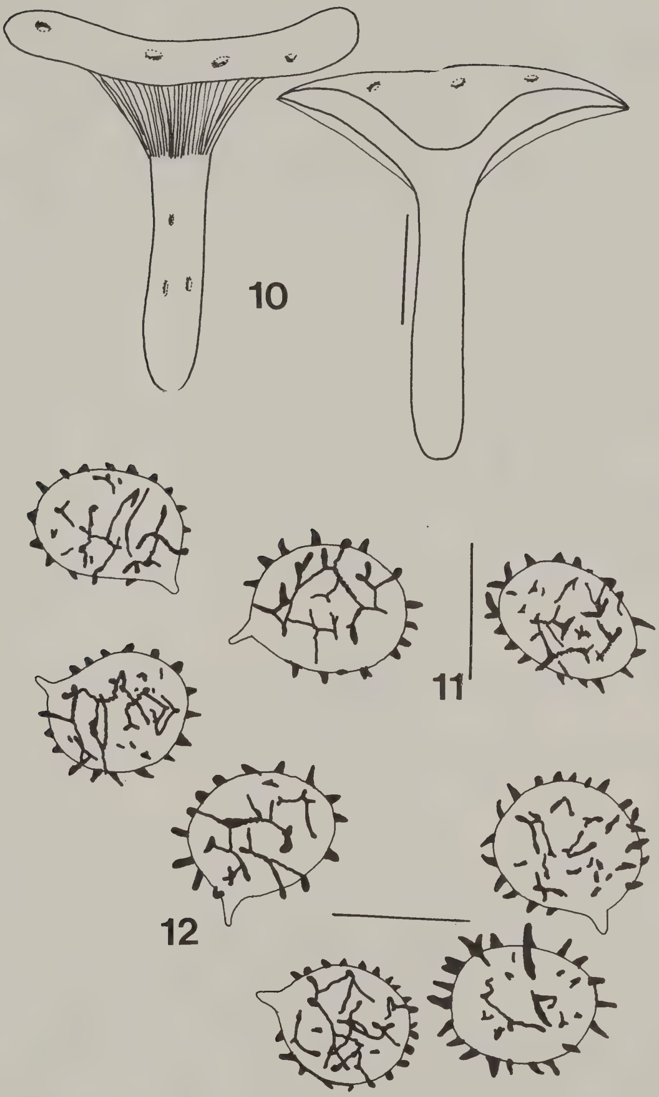
Lactarius subpalustris Hesler & A. H. Sm., *North American Species of Lactarius*, p. 334, 1979.

Figs. 10-16, 42

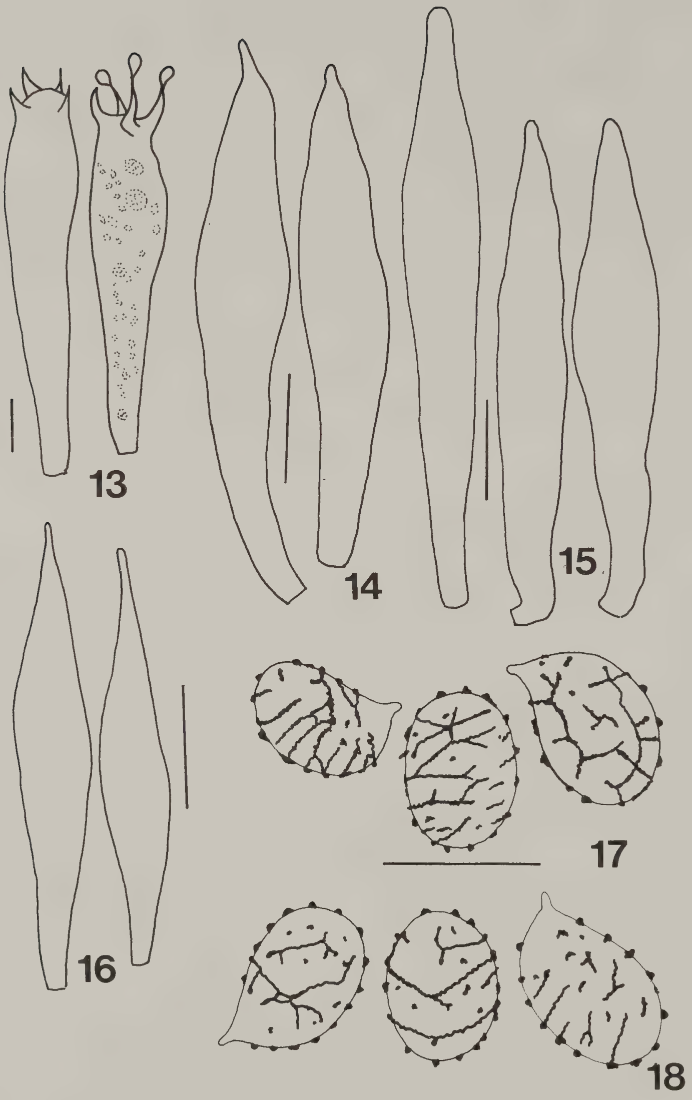
Pileus 85-117 mm diam., convex to depressed, subinfundibuliform, smooth, viscid, azonate or slightly zonate, glabrous, grey with olivaceous tinges (5C2-4B2), with greyish-brown (5C3) areoles. Lamellae adnexed, subdecurrent, subdistant to distant, cream color, with violaceous to finally brown spots when bruised. Stipe 40-70 x 11-13 mm, attenuate towards the base, whitish to slightly yellowish, obscurely scrobiculate. Latex white, invariable but staining violaceous-lilac (15B2-17B2) on cut surfaces. Context white, staining lilac (15A2-15B2) when exposed, taste strongly acrid, odor not recorded.

Spores 8.8-11.2(-12.8) x 8-9.6 μm, subelliptic, hyaline, with an incomplete reticulum and isolated spiny-warts at times connected, ornamentation up to 1.6(-2.4) μm high, apiculus 1.6 (-2.4) μm length, hyaline, with amyloid ornamentation, at SEM ridges and frequent connective bands forming reticulations are observed. Basidia 56-76 x 12-14 μm, clavate, hyaline, at times with refringent content, tetrasporic, 5.6-9.6 μm length. Pleurocystidia 88-108 x 12-13.6 μm, subfusoid-ventricose, apex variable, mucronate, obtuse, ± acute, frequent, yellowish. Cheilocystidia 60.8-84 x 9.6-12 μm, subfusoid-ventricose, subclavate, mucronate, with abundant refringent yellowish content. Epicutis an ixocutis sometimes loosely arranged, hyphae 1.6-4.8 μm, lactifers 4.8 μm broad, nodulose, yellowish. Context with lactifers 4.8-9.6(-11.2) μm broad, honey-yellowish, sphaerocysts frequent towards the epicutis, 4-24(-28) μm diam., thick-walled (up to 1.6 μm thick), yellowish, hyphae 4.8-9.6 μm broad, hyaline to yellowish. Hymenial trama hyphae 2.4-4 μm broad, lactifers 8-11.2 μm broad, yellowish. Stipe cuticle slightly gelatinized, hyphae up to 3.2 μm diam., tightly arranged, yellowish. Stipe context hyphae up to 9.6 μm diam., hyaline to yellowish, lactifers 10.4 μm broad, honey-yellowish, sphaerocysts up to 32 μm diam., wall 2.4 μm thick, hyaline to yellowish. Clamp connections absent.

Habitat. Terricolous, gregarious, at *Quercus* (*Q. polymorpha* Schlecht., *Q. laeta* Liebm.) forest. Collected on September.



Figs. 10-12.- ***L. subpalustris***, 10: basidiomata, 11-12: spores (10-11: García 6892; 12: type). Scale bar: 10 = 30 mm; 11-12 = 10 μm.



Figs. 13-18.- 13-16: ***L. subpalustris***, 13: basidia, 14-15: pleurocystidia, 16: cheilocystidia (13, 15-16: García 6892; 14: type). 17-18:***L. alnicola*** var. ***alnicola***, spores (17: Villarreal 1600; 18: Smith 89082). Scale bar: 13, 17 = 10 μm; 14-16 = 20 μm; 18 = 8 μm.

Studied specimens. **MEXICO**. **Tamaulipas**: 151 km road Tula-Ciudad Victoria, El Madroño, **García 6862; 6892** (both at ITCV; XAL). **U.S.A. Michigan**: Oakland Co., **Smith 81755** (type, MICH).

Discussion. Outstanding characters of ***L. subpalustris*** are pileus color without concentric zonations or only faintly zonate and the ornamentation, size and form of the spores. SEM observations of spores ornamentation are similar with those by Homola & Weber (1979). Hesler & Smith (1979) considered the acrid taste and whitish to cream lamellae as distinctive characters to separate ***L. subpalustris*** and ***L. maculatus***. However, according to fresh notes of an specimen from U.S.A. (Maine, **Bigelow 16578**, MASS) identified under ***L. maculatus*** by Hesler & Smith (1979), lamellae are ochraceous buff and taste is slightly acrid. Moreover, basidiomes have pileus with a conspicuosly zonate surface and bigger spores [(9-)10.5-12 x 7.5-10.5 μm] with projections as ridges and warts but scarcely connected by bands (fig. 41), which are considered here as major differences to distinguish both species.

ADDITIONAL RECORDS OF *LACTARIUS* FROM MEXICO

Lactarius alnicola A. H. Sm., *Brittonia 12*: 319, 1960 var. ***alnicola***
Figs. 17-22, 45

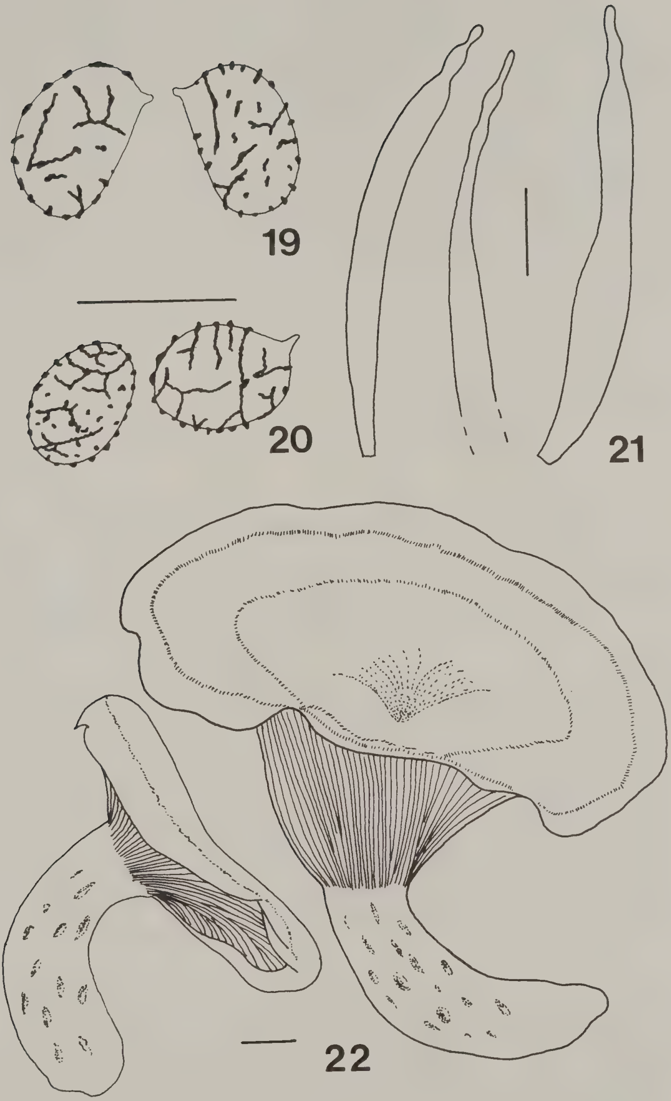
Pileus 70-120 mm diam., plano-convex to depressed or infundibuliform, margin inrolled, yellowish to pale honey (5B7-4A4), with pale broad concentric zonations, hygrophanous, irregularly stained brown, glabrous or only with draw fibrills, glutinous. Lamellae subdecurrent, whitish in immature specimens to yellowish when mature, narrow, crowded. Stipe 40-80 x 20-30(-45) mm, cylindric, generally dry to somewhat hygrophanous, glabrous, whitish-yellowish, scrobiculi yellowish and darker than surfaces. Context white and compact in immature specimens, yellowish and hollow at maturity, odor mild, taste strongly acrid. Latex white, invariable, only slowly staining cut surfaces yellow. $FeSO_4$ staining pileus and stipe green. NH_4OH and KOH negative.

Spores 7.2-10.4 x (5.6-)6.4-7.2(-8.8) μm, subelliptic to subglobose, ornamentation up to 0.8 μm high, apiculus 1.6 μm length, hyaline, with amyloid ornamentation, at SEM and light microscope the ornamentation appears as an incomplete reticulum with bands and isolated warts, at times with short ridges, at SEM many warts appear connected by bands. Basidia 44-52 x 8-10 μm, clavate, tetrasporic, sterigmata 4.8-5.6 μm length, hyaline. Pleurocystidia 52-70.4 x 6.4-7.2 μm, as macrocystidia, subfusiform, apex mucronate and constricted, infrequent, yellowish. Cheilocystidia 28-32 x 4-5.6 μm, similar to pleurocystidia, infrequent. Epicutis a thick ixocutis, hyphae 1.6-4.8 μm broad, ± loosely arranged, yellowish. Context hyphae 5.6-10.4 μm broad, lactifers 8-12.6 μm broad, yellowish, sphaerocysts 8-24 μm, walls up to 2.4 μm thick, yellowish. Hymenial trama irregular, hyphae 4-5.6 μm broad, hyaline to yellowish, lactifers 5.6-10.4 μm broad, yellowish. Clamp connections absent.

Habitat. On soil, solitary to subgregarious, in *Pinus* (*Pinus patula* Schlecht. & Cham.) and *Pinus-Abies* forests (*Abies hickellii* Flous & Gaussen, *P. ayacahuite* Ehrenb., *P. montezumae* Lambert, *P. patula* Schlecht. & Cham. and *P. pseudostrobus* Lindl.). Fruiting during June to October (except on July).

Studied specimens. **MEXICO. Veracruz**: E Cofre de Perote region, Municipio de Xico, Ejido Ingenio El Rosario,1 km S Tembladeras, El Revolcadero, **Villarreal 1600; Soto 17**; 1.5 km N Ingenio El Rosario, Los Gallos, **Tapia 180** (all at XAL). **U.S.A. Oregon**: Clackamas Co., **Smith 23640**; **Colorado**: Pitkin Co., **Smith 89082** (both at MICH; XAL).

Discussion. Candusso *et al.* (1994) reported this species from Baja California. However, the material recorded by these authors differs of the concept of ***L. alnicola*** var. ***alnicola*** *s. str.* Hesler & Smith (1979) because Candusso *et al.* reported latex '...turning citron-yellow instantly...'. Hesler & Smith (1979) considered the '...latex in this species is invariable but cut surfaces slowly stain yellow and finally clay color or darker...'. Moreover, spores according to Candusso *et al.* are more globose 6.5-9.5(-10) x 6-9 μm.



Figs. 19-22.- ***L. alnicola*** var. ***alnicola***, 19-20: spores, 21: pleurocystidia, 22: basidiomata; (20-22: Tapia 180; 19: Smith 23640). Scale bar: 19-20 = 8 µm; 21 = 12 µm; 22 = 10 mm.

Other varieties of ***L. anicola*** are var. ***pungens*** Hesler & A. H. Sm. and var. ***pitkinensis*** Hesler & A. H. Sm., and according to Hesler & Smith (1979) both differ of the typical in the strong and pungent odor when young in the former and in the whitish pileus at immature stages in the latter. The revision of type of ***L. anicola*** var. ***pungens*** [U.S.A., Canyon Lake Swamp, Marquette Co., **Smith 78673** (MICH)], showed that spores are slightly shorter, 7.2-8.8 x 6.4-7.2 µm (figs. 23, 44). However, additional collections and revisions of these varieties are required before concluding their status.

Lactarius corrugis Peck, *Ann. Rep. N. Y. State Mus. 32*: 31, ‘1879’ (1880).

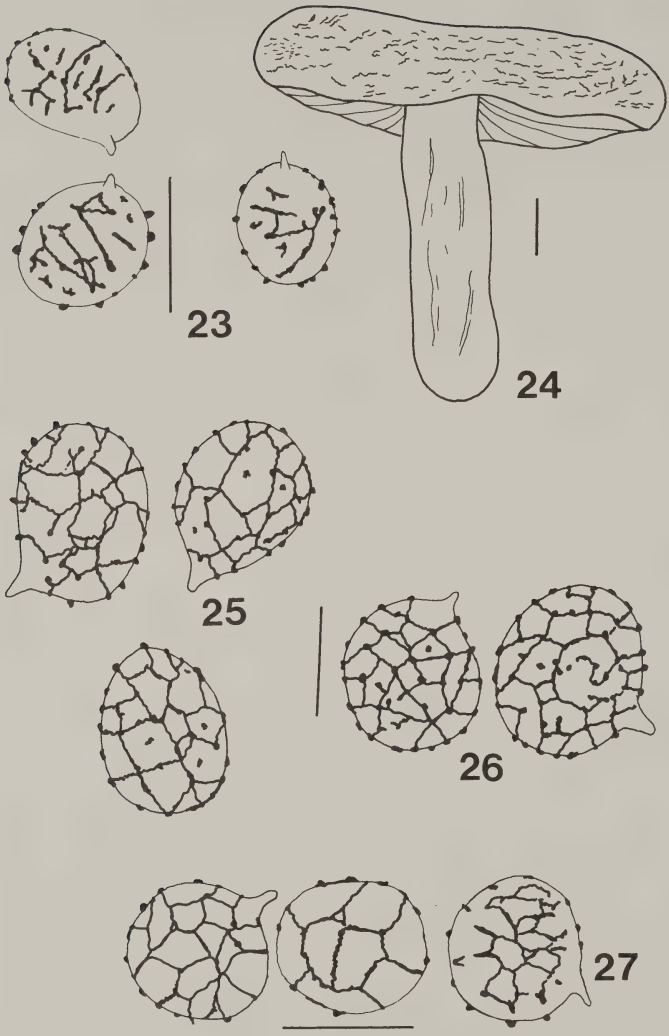
Figs. 24-32, 46-47

Pileus 50-115 mm diam., plano-convex to depressed or subinfundibuliform when mature, orange-brown (8E8), brown-mamey (8D8), reddish-orange (8C7) to dark orange-brown (8D7), velevety, rugate to rugate-areolate, at times cracky-areolate to rimose in old specimens, margin slightly inrolled. Lamellae ochraceous-white to pale brown, at times with yellowish-pink (5A2) tinges, stained brown when bruised, adnate to subdecurrent, ± closed, thick, margin entire. Stipe 33-90 x 10-24 mm, subcylindric, attenuate towards the base, yellowish-orange (7C7) to brown-orange (7D8), velvety to finely tomentose, at times rugate. Context yellowish, odor and taste inconspicuous. Latex white, plenty, invariable but staining cut or bruised surfaces brown. KOH staining pale green pileus and stipe, yellow on context. Spore print white.

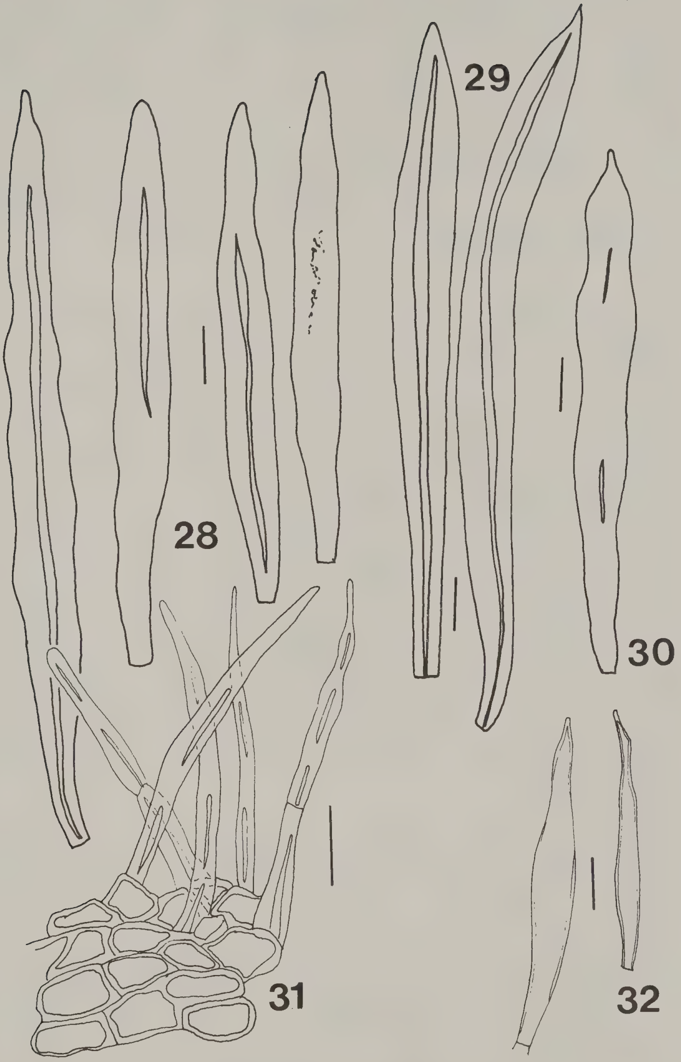
Spores (8-)10.4-12.8(-13.6) x (8-)9.6-11.8(-12.8) µm, subglobose to globose, ornamentation up to 0.5(-0.8) µm high, apiculus up to 2.4 µm length, hyaline, with amyloid ornamentation, at light microscope and at SEM thin and low bands connected forming a complete reticulum, chambers of the reticulum in polygonal arrangement, at times low projections observed, but mostly no projections seen. Basidia 64-72 x 8-10.4 µm, tetrasporic, sterigmata up to 8 µm length, yellowish. Pleurocystidia (68-)84-124 (-144) x (6.4-)8-12 µm, fusiform to fusiform-sinuate, at times constricted at apex, thick walled up to 4.8 µm thick, yellow to greenish-yellow, conspicuos, numerous. Cheilocystidia 60.8-80 x (6.4-)8-9.6 µm, subfusiform, wall up to 3.2 µm thick, yellow to greenish-yellow, numerous. Epicutis a trichodermis, pileocystidia (20-)48-84(-124) x (3.2-)4-6.4(-7.2) µm, fusiform, lanceolate, aciculate, subcylindric, sinuate, at times ramified, honey-yellow to yellowish-green, thick walled, up to 2.4(-3.2) µm thick, numerous, hypodermium composed of subisodiametric elements 8-12(-16)(-24) µm diam., tightly arranged, wall up to 2.4 µm thick, yellowish. Context with sphaerocysts 18-24 (-32) µm diam., greenish-yellow, hyphae 3-6 µm broad, hyaline to yellowish, lactifers 17 µm broad, yellowish. Hymenial trama irregular, hyphae 4.8 µm broad, hyaline to yellowish, lactifers up to 10.4 µm broad, with yellowish refringent content, sphaerocysts 24 µm diam., wall 0.8 µm thick, more frequent towards the origin of medium stratum, yellowish.

Habitat. On soil, subgregarious, in mesophytic forests (with *Quercus* spp., *Alnus jorullensis* H. B. & K., *Carpinus carolineana* Walter, *Ostrya virgineana* (Miller) K. Koch., *Liquidambar macrophylla* Oerstec) and from *Quercus*, *Quercus-Alnus, Pinus* and *Pinus-Quercus* forests. Fruiting during July to October.

Studied specimens. **MEXICO**. **Chiapas**: Lagos de Montebello, **Guzmán 10476** (ENCB); N San Cristobal de Las Casas, road to Comitán, Las Grutas de Rancho Nuevo, **Guzmán 30538** (XAL). **Chihuahua**: Municipio de Temosáchi, Nabogame, **Laferriere 1805**, **1805-b** (ARIZ; XAL). **Durango**: Navios, road Durango-Mazatlán, **Valenzuela 198** (ENCB) **Guerrero**: Municipio de Chichihualco, 4.5 km Carrizal-Atoyac, **Lugo s.n.** (Aug. 16, 1980) (FCME). **Hidalgo**: Road to Zacualtipan, near Presa Arroyo Zarco, (MEXU 10901); 92 km road Pachuca-Tampico, 6 km before Zacualtipan, **García s.n.** (Aug. 5, 1978); **Cercado-García 150** (both at FCME); 4 km before Zacualtipan, Piedra Blanca, **Aguilar s.n.** (Aug. 26, 1978) (FCME). **Jalisco**: Road to Los Volcanes, 6-7 km NW Cuautla, **Mc Vaugh 241** (MICH); Municipio de Tamazula, San Francisco, **Arreaga-Pérez 11; 65** (IBUG); Municipio de Zapopan, Cerro del Tepopote, **Guzmán-Dávalos 5507** (IBUG, XAL). **Michoacán**: Km 23 road Morelia-Mexico, way to Mil Cumbres, **Guzmán 26043** (XAL); Municipio de Charo, road Morelia-Mil Cumbres, km 23 deviation to Pino Real, **Guzmán 18157** (ENCB); km 219-220 road Morelia-Toluca, Pontezuelas, **Cifuentes 566**



Figs. 23-27.- 23: ***L. alnicola*** var. ***pungens***, spores (type). 24-27: ***L. corrugis***, 24: basidiomata (Miller, Jul./1959), 25-27: spores (25: Lafferriere 1805; 26: Medellín-Leal, Oct./1958; 27: type). Scale bar: 23, 25-27 = 10 μm; 24 = 10 mm.



Figs. 28-32.- ***L. corrugis***, 28-30 pleurocystidia, 31: epicutis, 32: cheilocystidia (28: type; 29 & 31: Medellín-Leal, Oct./1958; 30 & 32: Lafferriere 1805). Scale bar: 28-32 = 10μm.

(FCME). **Oaxaca**: 60 km NW Ixtepec, 6 km Guadalupe Guevea de Humboldt, **Pérez-Ortíz 750** (ENCB); road to Ixtepeji, El Punto, **Miller s.n.** (Jul. 1959) (ENCB); road Juchatengo-Sola de Vega, **Miller s.n.** (Jul., 1959) (ENCB); near Huautla de Jiménez, San Agustín, **Singer s.n.** (MEXU 7253). **San Luis Potosí**: km 361 road San Luis Potosí-Rio Verde, Puerto La Huerta, **Medellín-Leal s.n.** (Oct., 1958) (ENCB). **Tamaulipas**: Municipio de Gómez Farías, Rancho El Cielo, **García 4888** (ITCV). **U.S.A**. **New York**: Sand Lake and Gansevort, **Peck s.n.** (type, NYS).

Discussion. This species is related to ***Lactarius volemus***, inclusive some specimens at herbaria where missidentifyied under the latter. As for the differences in ***L. corrugis*** and ***L. volemus*** and in accordance with other authors (Hesler & Smith, 1979; Lalli & Pacioni, 1992) both species can be separated by bigger spores in the former [(7.4-)7.9-12 x (6.8-)7.5-11(-12) μm vs. (7.1-)7.8-9(-11.1) x (6.7-)7.4-8.5(-9.9) μm, respectively] and longer pileocystidia in ***L. corrugis***. However, Lalli & Pacioni (1992) indicated for this latter species pileocystidia 120-150 x 4 μm, longer than those observed in Mexican specimens and in the type, differing with the observations by Hesler & Smith (1979) [45-80 (-128) x 2.5-6 μm], which agree with the studied materials. In addition, hypodermial elements tend to be shorter in ***L. corrugis*** than in ***L. volemus*** (8-24 μm), although, at times some elements in ***L. corrugis*** are up to 24 μm diam.

According to present observations in type and Mexican specimens, as well as in those based in several collections of ***L. volemus*** (Montoya, 1994), it is concluded that size and the ornamentation pattern of spores are the more constant features to distinguish both taxa. ***L. volemus*** presents shorter spores (up to 8 μm wide), with a stronger reticulum which presents higher projections (up to 1.2 μm high) (Montoya, 1994). Moreover, macroscopic characters are also important in the identification of these species. In ***L. volemus*** colors of basidiomata are lighter and pileus is not rugate-areolate as in ***L.corrugis***.

The specimen **Laferriere 1805** from Chihuahua, was considered by Laferriere & Gilbertson (1992) as ***L. hygrophoroides***, but in this latter species, spores are elliptic, not reticulate and lacking cystidia, and also differs by macroscopic features. Except specimen **McVaugh 241** recorded by Lalli & Pacioni (1992), all above collections are reported from new localities in Mexico.

Lactarius deceptivus Peck, *Ann. Rep. N. Y. Mus. State Mus. 38*: 125, 1885

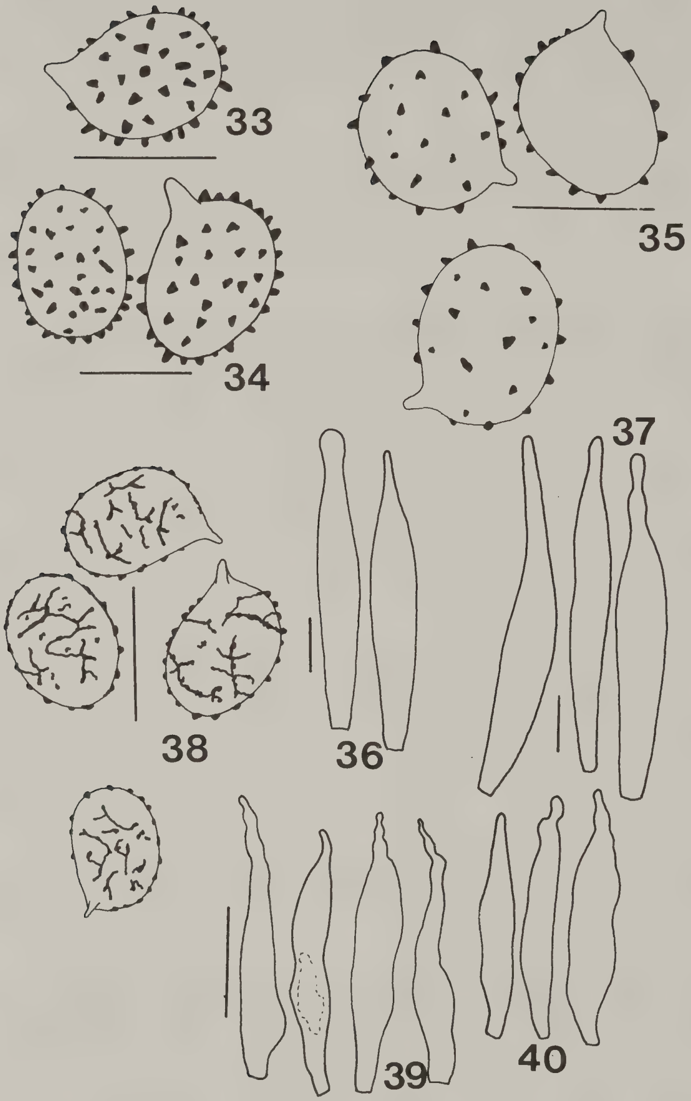
Figs. 33-37, 48

This is an edible mushroom popularly known as ‘oreja de chivo’ (kid ear) at the State of Puebla, and sold at traditional markets. It was previously reported from Mexico (Montoya *et al.*, 1990) and at present it is reported from new localities.

Important characters not discussed in the distinction of this species by Montoya *et al.* (1990) are the basidiomes white to whitish-yellowish (3A3-4A4), with yellowish-brown (6D6) stains and finely velvety, pileus with a finely membranose inrolled margin. Lamellae subdistant to distant, broad, thick, white to yellowish, at times with faint pinkish tinges and with yellowish-brown stains. The white, invariable latex, slowly staining the cut or bruised surfaces yellowish-brown. KOH staining latex and context yellowish, and on pileus reddish; NH_4OH negative. Ornamentation of spores at SEM is observed compound by isolated warts or only as unconnected, obtuse and conical papillas, at times rounded and some of them more robust, this observations agree with those by Homola & Kimball (1975), Homola & Weber (1979) and Grand & Moore (1970).

It was found fruiting during June-November, solitary to gregarious on soil. At *Quercus*, *Pinus-Quercus* and *Pinus-Abies* forests.

Studied specimens. **MEXICO**. **Chiapas**: Laguna Bélgica, XI Mushroom Exposition from Chiapas, **Montoya 3137** (XAL). **Chihuahua**: Municipio de Guachochi, Cabórachi, **Reyes s.n.** (MEXU 19925). **Hidalgo**: Around Presa Arroyo Zarco, road to Zacualtipan, **Pérez & Aguirre s.n.** (MEXU 10903). Municipio de Tenango de Doria, Agua Blanca de Iturbide, **Gimate 1049** (ENCB);



Figs. 33-40.- 33-37: ***L. deceptivus***, 33-35: spores, 36: cheilocystidia, 37: pleurocystidia (33: Ventura 17497; 34, 36-37: Montoya 1593; 35: Ramírez 5-10). 38-40: ***L. indigo*** 38: spores, 39: pleurocystidia, 40: cheilocystidia (Bandala 1802). Scale bar: 33, 36-38, 40 = 10 μm; 34-35 = 8 μm; 39 = 20 μm.

Ejido Muridores, 2 km from Apulco road to Agua Blanca, **Cifuentes 831** (FCME); 8 Km E from the deviation to Tianguistenango, **González-Pérez s.n.** (Aug. 26, 1978) (FCME); 4 km from Zacualtipan, Piedra Blanca, **Aguilar s.n.** (Aug. 5, 1978) (FCME). **Jalisco**: Municipio de Bolaños, near Parteaguas, 26 km NW Bolaños, road to Los Amoles, **Guzmán-Dávalos 3344** (IBUG); Municipio de Mezquitic, 4 km from Bajio Los Tules, road Bolaños-Tenzompa, **Guzmán-Dávalos 3353** (IBUG; XAL). **Michoacán**: Parque Nacional Los Azufres, **Brizuela 643** (ENCB; XAL); Municipio de Ciudad Hidalgo, Los Azufres Region, San José, **Villegas & González 864** (FCME). **Oaxaca**: Huautla de Jiménez, **Guzmán & Herrera s.n.** (MEXU 7324); road to Ixtlán de Juárez, near La Esperanza, Puerta del Sol, **Betancourt 209** (ENCB); 1.6 km road Tlaxiaco-Mixtepec, NE San Juan Mixtepec, Tres Cruces, **Reyes s.n.** (MEXU 21336). **Puebla**: Municipio de Teziutlán, approx. 3 km from Teziutlán, cerro de Techachapa, **Montoya 1593** (XAL); Municipio de Zacatlán, mercado de Zacatlán, **Ramírez 5-10** (XAL; ENCB). **Querétaro**: Municipio de Xalpa, km 150 road San Juan del Río-Pinal de Amores a El Llano, **Villegas 501** (FCME; XAL). **Veracruz**: Municipio de Acajete, La Joya, **Ventura 17497** (both at XAL). **U.S.A**. **Maine**: Penobscot Co., **Homola 2380**; Near Lago Pushaw, **Homola 4012** (both at MICH, ENCB and XAL).

Lactarius indigo (Schw.) Fr., *Epicr. Syst. Mycol.* p. 341. 1838 var. ***indigo***

Figs. 38-40

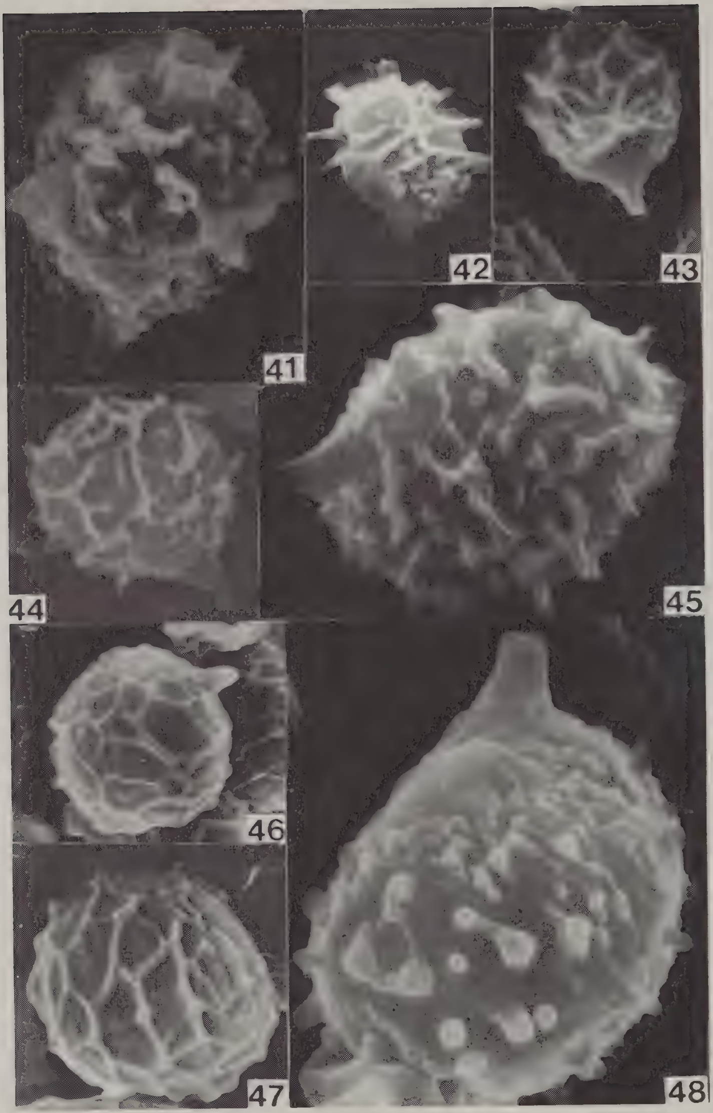
Main characters to distinguish this fungus are: latex indigo blue (21D8-21E8), invariable but staining the cut surfaces green and after some hours changing on white paper green. Pileus with conspicuous concentric zonations, canescent or argillaceous, with bluish (20E3) tinges, indigo blue (21E5) in young specimens and pale greyish-blue (20D3-21D3) with yellowish-brown tinges when mature, basidiomes irregularly stained green. Taste and odor mild. KOH negative, only pileus darkening. Pleurocystidia 40-56 x 6.4-8 μm, subfusiform, apex constricted, ventricose, with dark honey-brown contents, darkening with Melzer. Cheilocystidia 40-45.6 x 5.6-7.2 μm, similar to pleurocystidia, frequent. Epicutis an ixocutis. Spore print cream color. Spores 7.2-9.6 x 6.4-7.2 μm, ornamentation up to 0.8 *μ*m, at SEM with a ± complete reticulum, with some projections and few isolated warts.

L. indigo is an edible mushroom sold at Mexican markets, and known with different popular names. In Central area of the Country it is known as 'añil', 'azul', 'hongo azul', 'zuin' and 'zuine'. Herrera & Guzmán (1961) reported that it is sold at Tenango del Valle and Amecameca markets. It is also common at La Merced market at Mexico City, at the market of Tenancingo, Hidalgo, at Zacapoaxtla and Teziutlan, Puebla and at San José at Xalapa, Veracruz, where it is known with the mentioned names or as 'quexque' (blue) in Veracruz and Puebla.

It was found solitary to gregarious on soil, in mesophytic forests (with *Quercus* spp., *Alnus jorullensis* H.B. & K., *Carpinus carolineana* Walter, *Ostrya virgineana* (Miller) K. Kotch., *Liquidambar macrophylla* Oerstec), *Quercus*, *Pinus-Quercus*, *Quercus-Alnus*, *Quercus-Arbutus-Populus*, *Pinus*, *Pinus-Alnus forests*. Fruiting during June to November and occasionaly on January.

Studied specimens. **Distrito Federal**: Ciudad de Mexico, Mercado de Azcapotzalco, **Mendiola 92**; Mercado de La Merced, **Guzmán 17794**; **Velázquez 803** (all at ENCB). **Estado de Mexico**: Municipio de Santa Ana Jilotzingo, El Cedral, **Pérez-Silva *et al.* s.n.** (MEXU 21973); Mercado de Amecameca, **Herrera s.n.** (MEXU 3267); **Guzmán 1593**; **Martínez 18** (both at ENCB). **Hidalgo**: Mercado de Tenancingo, **Herrera s.n.**(Sept. 16, 1956) (ENCB); km 115 road Mexico-Tampico, before Real del Monte, Rancho Vicente Guerrero, **Pérez-Silva *et al.* s.n.** (MEXU 20108); San Miguel Regla, **Pérez-Hernández s.n.** (MEXU 13563). **Guerrero**: 16 km SW Mazatlán, Cerro Tepoxtepec, **Alarcón-Guevara 255**. **Jalisco**: Road Cd. Guzmán-San Andrés Ixtlán, El Corralito, **Guzmán 11939** (both at ENCB); S Sierra La Primavera, road San Isidro-Mazatepec, W Guadalajara, **Manzi s.n.** (Aug. 14, 1978); Municipio de Atenquillo, 5 km NW Cuautla, **García 88**. **Michoacan**: Municipio de Charo, km 23 road Morelia-Mil Cumbres, deviation to Pino Real, **Guzmán 18194** (all at ENCB); Zitácuaro, Cerro Los Aguacates, **Pérez-Silva *et al* s.n.**. (MEXU 17791); Mil Cumbres Region, Puerto Garnica zone, **Guzmán 22715** (ENCB); Senguio, near Maravatio, **López-**

López s.n. (MEXU 1975). **Morelos**: Hueyapan, **De Avila 98**; Old road Mexico-Cuernavaca, road Valle del Tepeite, ± 5 km before Cuernavaca, NW Santa María Ahuacatitlán, **Chacón 653**. **Puebla**: km 71 old road Mexico-Puebla, near Puente del Emperador, **Servín-Massieu s.n.** (Oct. 17, 1965) (all at ENCB); approx. 3 km before Teziutlán, Cerro de Techachapa, road Perote-Teziutlán, **Bandala 1802**; Mercado de Cuetzalan, **Guzmán 28244**; Mercado de Huejotzingo, **Prado s.n.** (Jul. 15, 1989); Mercado de Teziutlán, **Montoya 1625** (all at XAL), Mercado de Zacapoaxtla, **Pérez-Silva *et al* s.n.** (MEXU 16511). **Queretaro**: Municipio de Landa de Matamoros, Km. 225 road Jalpan-Xilitla, **Colón 814**; Parque San Joaquín, around San Joaquín, **Valenzuela 3315**. **San Luis Potosí**: km 361 road San Luis Potosí-Río Verde, Puerto La Huerta, El Piojo, **Medellín-Leal s.n.** (Oct., 1958); Road-Ciudad Valles, 5 km E Rayon, **Sánchez 134**. **Tamaulipas**: Municipio de Gómez Farías, 10 km W Buenos Aires, Rancho la Calavera, **Guzmán 20118** (all at ENCB). **Tlaxcala**: Municipio de Apizaco, Mercado de Apizaco, **Montoya-Ezquivel 27**. Municipio de Tlaxcala, Mercado de Tlaxcala, **Montoya-Ezquivel 522-A**; Municipio de Trinidad Sánchez Santos, SE Volcán La Malintzi, Fco. Javier Mina, **Montoya-Ezquivel 701** (all at TLXM). **Veracruz:** Municipio de Atlahuilco, 7 km W Atlahuilco, near Zacatlamanca, Tepechititla, **Pérez-Moreno 82**; Municipio de Banderilla, SW Banderilla, Cerro La Martinica, **Bandala 1552**; **Del Angel 58**; **Ortega s.n.** (Jul. 22, 1978) (all at XAL); Municipio de Chiconquiaco, Gutiérrez Zamora, **Ventura 17466** (ENCB); Municipio de Emiliano Zapata, Ejido Ojuelos, 5 km NE El Lencero, **Bandala 302**; **Montoya 2064**; **2070** (all at XAL); Municipio de Perote, 39 km national road Xalapa-Perote, Cruz Blanca, **Montoya 1014**; Municipio de Rafael Lucio, Granja Santa Bárbara, **Chacón 2310**. Municipio de Río Blanco, 5 km N Río Blanco, Pico del Águila, **Pérez-Moreno 39**; Municipio de San Andrés Tlalnehuayocan, 7.5 km road San Andrés Tlalnehuayocan-Plan de Sedeño, **Montoya 700**; **1330** (all at XAL); Road Plan de Sedeño-San Andrés Tlalnehuayocan, near Plan de Sedeño, **Bandala 903**; **Bandala 1766**, **1773**; **Montoya 2029** (all at XAL); Municipio de Totutla, El Mirador, **Ventura 16301** (ENCB); Santa Rita (MEXU 5357); Xalapa, Mercado de San José, **Villarreal 2465**; Parque Ecológico Fco. J. Clavijero, km 2.5 old road Xalapa-



Figs. 41-48.- 41: ***L. maculatus*** (Bigelow 16578, 5000 x). 42: ***L. subpalustris*** (type, 5000 x). 43: ***L. resimus*** var. ***resimus*** (Montoya 1369-A, 7500 x). 44: ***L. alnicola*** var. ***pungens*** (type, 5000 x). 45: ***L. alnicola*** var. ***alnicola*** (Smith 89082, 7500 x). 46-47: ***L. corrugis*** (Medellin-Leal, Oct., 1958, 5000 x; 47: type, 7500x). 48: ***L. deceptivus*** (Montoya 1593, 7500 x).

Coatepec, **Chacón 3559**; **Montoya 757** (all at XAL). **Zacatecas**: 7 km NW Monte Escobedo, **Acosta 531**; 5.5 km NW Monte Escobedo, Los Álamos, **Acosta 594** (both at ENCB).

ACKNOWLEDGEMENTS

We appreciate the support given by Instituto de Ecología and SNI. Also, we are indebted to Dr. Gabriel Moreno for the critical revision to this paper. Likewise to Dr. G. Guzmán for his observations and criticisms during the study of the species here presented. J. Cifuentes (FCME), A. Estrada (TLXM), J. García (ITCV), L. Guzmán-Dávalos (IBUG), J.H. Haines (NYS), R.L Shaffer (MICH) kindly loaned materials of their respective Herbaria. A. García, J. Rico and D. Fernández from IE enthusiastically assisted at the Herbarium.

LITERATURE CITED

Bon, M., 1980. Clè monographique du genre *Lactarius* (Pers.: Fr.) S.F. Gray. *Doc. Myc. 10:* 1-85.

Candusso, M., A. Gennari and N. Ayala, 1994. Agaricales of Baja California, Mexico. *Mycotaxon 50:* 175-189.

Gándara, G., 1929-1931. Nota acerca del hongo mexicano llamado "el enchilado". *Mem. Soc. Antonio Alzate 52:* 253-257.

Grand, F. L. and R. T. Moore, 1970. Ultracytotaxonomy of Basidiomycetes. I. Scanning electron microscopy of spores. *Jour. Elisha Mitchell Sc. Soc. 86*: 106-117.

Guevara, G., J. García, J. Castillo and O.K. Miller, 1987. New records of *Lactarius* in Mexico. *Mycotaxon 30*: 157-176.

Guzmán, G., 1973. Some distributional relationships between Mexican and United States mycofloras. *Mycologia 45*: 1319-1330.

Guzmán, G., 1977. *Identificación de los hongos comestibles, venenosos, alucinantes y destructores de la madera.* Limusa, México, D.F.

Herrera, T. and G. Guzmán, 1961. Taxonomía y ecología de los principales hongos comestibles de diversos lugares de México. *An. Inst. Biol. UNAM 32*: 33-135.

Hesler, L. R. and A. H. Smith, 1979. *North American Species of Lactarius*. Univ. Michigan Press, Ann Arbor.

Homola, R. and N. Weber, 1979. Scanning electron-microscope studies of *Lactarius* spore ornamentation. In: Hesler, L.R. and A.H. Smith. *North American species of Lactarius*. University of Michigan, Ann Arbor.

Homola, R. and J. Kimball, 1975. Scanning electron microscopy of spore ornamentation in the genus ***Lactarius***. *The Botanist 14*: 179-189.

Kong-Luz, A. and A. Estrada-Torres, 1994. A new species of *Lactarius* from Mexico. *Mycotaxon 50*: 443-466.

Kornerup, A. and J. H. Wanscher, 1978. *Methuen handbook of colour*. Methuen, London.

Laferriere, J. E. and R. L. Gilbertson, 1992. Fungi of Nabogame, Chihuahua, México. *Mycotaxon 44:* 73-87.

Lalli, G. and G. Pacioni, 1992. *Lactarius* sect. Lactifluus and allied species. *Mycotaxon 44*: 155-195.

Montoya, L., 1994. Las especies de *Lactarius* (Fungi, Basidiomycotina) conocidas en México, contribución al estudio monográfico del género. MSc. thesis, Fac. Ciencias, UNAM, México, D.F.

Montoya, L., G. Guzmán and V. M. Bandala, 1990. New records of *Lactarius* from Mexico and discussion of the known species. *Mycotaxon 38*: 349-395.

Neuhoff, W., 1956. *Die Milchlinge.* Verlag, Heilbrunn.

MYCOTAXON

Volume LVII, pp. 451-456 January-March 1996

NOTES ON CONIDIAL FUNGI. III. AN INTERESTING SPECIES OF *POLYSCHEMA* FROM CUBA

R.F. Castañeda Ruiz[1], J. Guarro[2] and J. Cano[2]

[1] Instituto de Investigaciones Fundamentales en Agricultura Tropical "Alejandro de Humboldt" (INIFAT), Calle 1, esq. 2, Stgo. de las Vegas, C. Habana, Cuba. [2] Unitat de Microbiologia, Facultat de Medicina i Ciències de la Salut, Universitat Rovira i Virgili, 43201-Reus, Tarragona, España

ABSTRACT

Polyschema venusta sp. nov., found on decaying leaves, is described and illustrated. It is distinguished by its navicular, 5 - 13-septate, dark brown to black, tuberculate conidia. The differences between *P. venusta* and similar species are briefly discussed and a key to the species of the genus is provided.

Key words: *Polyschema*, tropical fungi, systematics.

RESUMEN

Se describe e ilustra *Polyschema venusta sp. nov.*, aislada sobre hojas descompuestas procedentes de Cuba. Se distingue por sus conidios naviculares, con 5-13 septos, de pardo oscuros a negros y tuberculados. Se discuten las diferencias entre *P. venusta* y especies parecidas y se propone una clave dicotómica de las especies del género.

Palabras clave: *Polyschema*, hongos tropicales, sistemática.

The genus *Polyschema* Upadhyay (1966) has been enlarged with several taxa previously described in *Clasterosporium* Schweinitz and *Bactrodesmium* Cooke and by the addition of several new species. After Ellis's (1976) revision, more taxa have been described by Tiwari *et al.* (1977), Pandeya & Saksena (1978), Joshi *et al.* (1983), Rao & Reddy (1984), Matsushima (1975, 1989) and Mercado & Mena (1992). Tiwari & Agrawal (1973) published *Polyschema indica* as new, but it is a later homonym of *P. indica* Bahera, Mukerji and Sharma (Ellis, 1976). A new species is added in the present work.

Polyschema venusta Castañeda, Guarro et Cano, anam. sp. nov. (Figs.1,2)

Ad fungos conidiales, hyphomycetes, pertinens. Coloniae effusae, amphigenae, brunneae vel atrobrunneae. Mycelium plerumque superficiale et aliquot in substrato immersum, ex hyphis ramosis, septatis, verrucosis, interdum tuberculatis, brunneis usque olivaceo-brunneis, 2-5 μm diam. compositum. Conidiophora conspicua, (interdum in cellula conidiogena reducta) simplicia, erecta vel prostrata, parum cylindrica usque clavata infra, globosa vel inflata sursum, verrucosa, interdum tuberculata, brunnea ad basim et dilute brunnea ad apicem, 14-22 x 4-6 μm. Cellulae conidiogenae monotreticae, terminales, determinatae, incorporatae, globosae usque clavatae, verrucosae usque leviter tuberculatae, pallide brunneae vel brunneae, 5-7 x 6-7 μm. Conidia primo obvoidea, deinde navicularia usque late fusiformia, 5-13 plerumque 10-septata, acrogena, singula interdum breve catenata, tuberculata, utrimque verrucosa, interdum minute verrucosa vel levia ad apicem, nigra vel atrobrunnea, utrimque brunnea, sicca, 42-70 x 18-27 μm.

Teleomorphosis ignota.

Conidial fungi, hyphomycetes. *Colonies* spreading, amphigenous, brown to dark-brown. Mycelium mostly superficial. Hyphae branched, septate, verrucose, sometimes tuberculate, brown to olivaceous-brown, 2-5 μm diam. *Conidiophores* differentiated (sometimes reduced to conidiogenous cells), unbranched, erect or prostrate, slightly cylindrical to clavate below, globose or inflated above, verrucose, sometimes tuberculate, brown at the base, pale brown to brown at the apex, 14-22 x 4-6 μm. *Conidiogenous cells* monotretic, terminal, determinate, integrated, globose to clavate, verrucose to slightly tuberculate, brown to pale brown, 5-7 x 6-7 μm. *Conidia* at the beginning obovoid, thereafter navicular to broadly fusiform, 5-13 (mostly 10) septate, acrogenous, sometimes lateral, solitary, sometimes in short chains, tuberculate, verrucose at the ends, sometimes minutely verrucose or smooth-walled at the apex, black to dark-brown at the ends, dry, 42-70 x 18-27 μm.

Teleomorph unknown.

Habitat: On decaying leaf of unidentified tree, Jaruco, Provincia La Habana, Cuba.

Holotype: INIFAT C93/327, R.F. Castañeda, 28 September 1993. La Habana, Cuba.

Culture ex type deposited in MUCL Culture Collection (Louvain-la-Neuve, Belgium) (MUCL 39001).

Colonies on corn-meal agar (Difco) attaining 10-15 mm in 7 days at 25°C, green to olivaceous brown, reverse black, floccose. Vegetative hyphae branched, verrucose or tuberculate, olivaceous-brown, 3-6 μm diam. *Conidiophores* arising

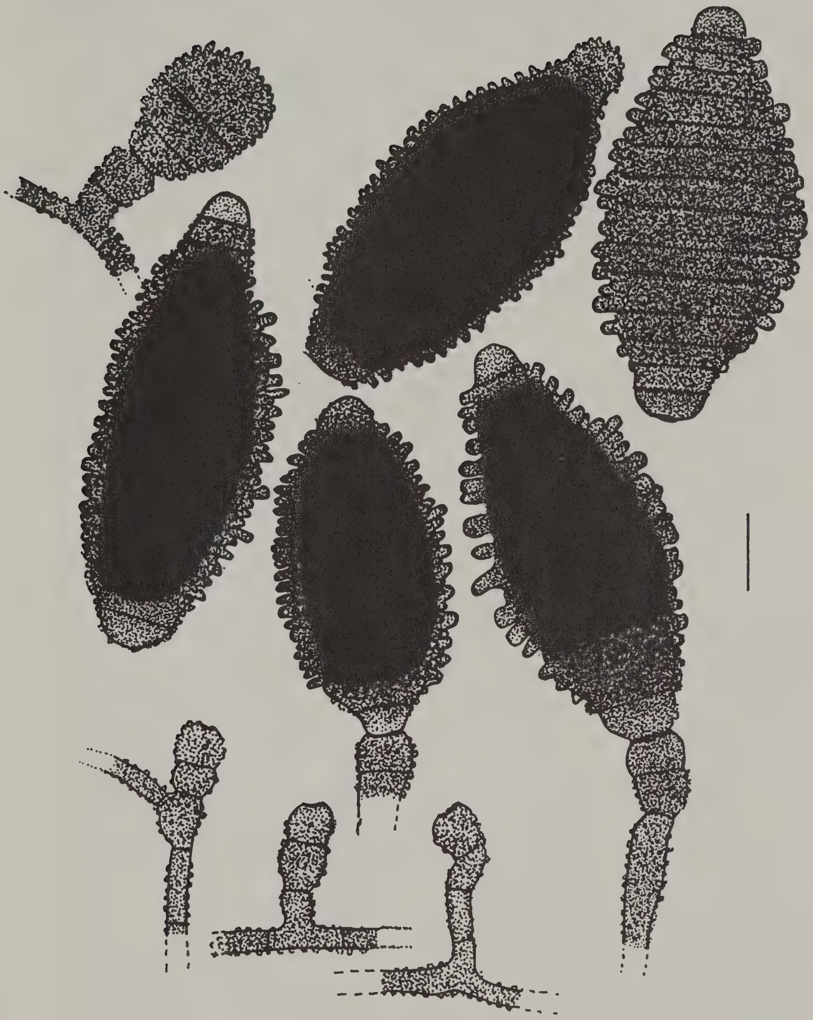


Fig. 1.- *Polyschema venusta* (INIFAT C93/327). Conidiophores and conidiogenous cells (bar = 10 μm).

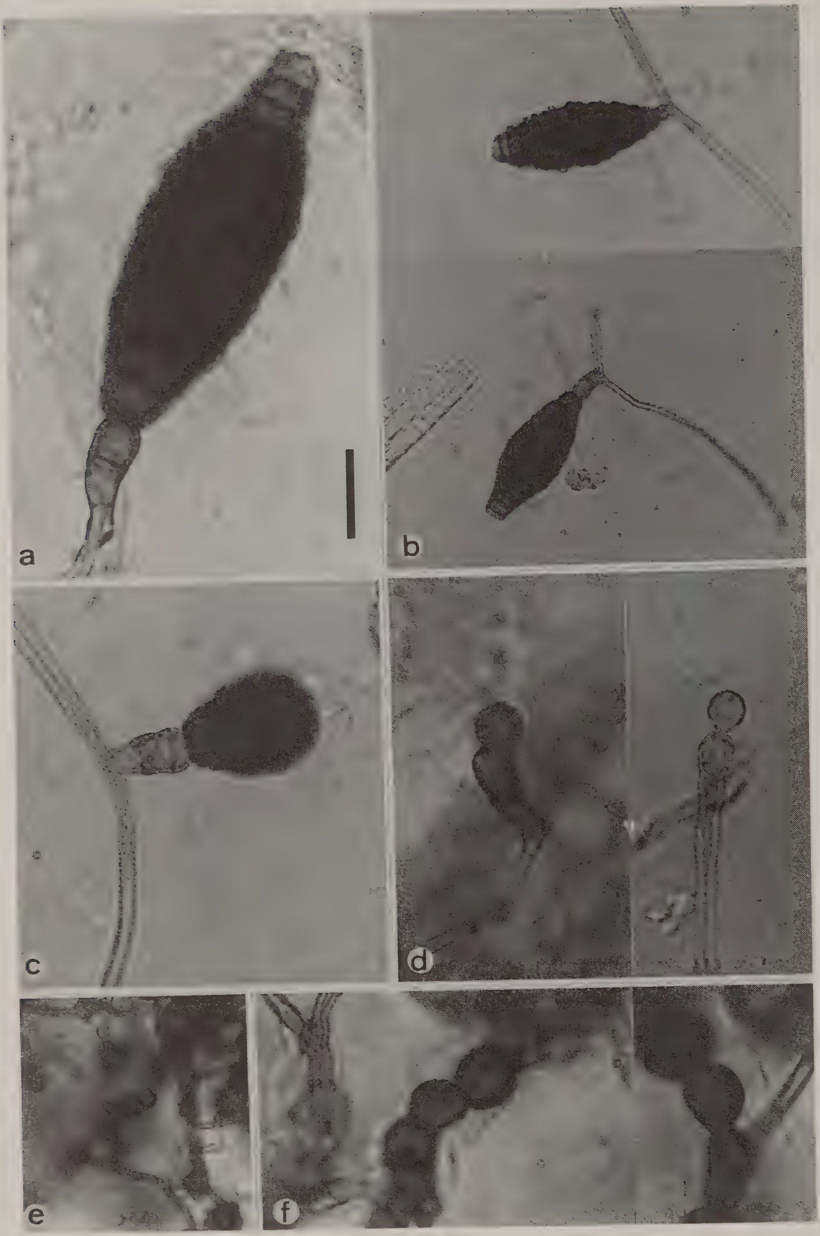


Fig. 2.- *Polyschema venusta* (INIFAT C93/327). **a, b, c,** conidiophores; **d,** conidiogenous cells; **e,f,** chlamydospores (**a,c,d,f,** bar = 10 μm; **b,e,** bar = 25 μm).

laterally from repent and aerial hyphae, differentiated, erect, unbranched, tuberculate, brown, up to 210 µm long. *Conidia* navicular to broadly fusiform, 5-10 (mostly 6-8 septate), tuberculate, black or dark-brown, brown at the ends, 30-60 x 13-20 µm. *Chlamydospores* numerous, in chains or solitary, smooth, sometimes verrucose, brown to olivaceous, globose to ellipsoid, 10-13 x 5-10 µm.

Polyschema venusta may be compared with *P. larviformis* (Fairman) M.B. Ellis (1976), but conidia are obclavate or ellipsoidal, sometimes sigmoid, verrucose, reddish brown, 30-80 x 16-20 µm. *P. venusta* also resembles *P. chambalensis* Joshi *et al.* (1983) in the pigmentation and ornamentation of their conidia but they differ in shape, size and septation. Chlamydospores are present in culture in *P. venusta* and absent in *P. chambalensis* and *P. larviformis*.

KEY TO SPECIES OF POLYSCHEMA

1 .- Conidia smooth walled..2
1' .- Conidia with ornamented walls...4

2 .- Conidia with 1 septum, obovoid, 14-21 x 7-11 µm ....*P. lignicola*
2' .- Conidia with more than 1 septum...3

3 .- Conidia 11-20 x 4.8 - 8 µm, 2-3 septate ....*P. cubensis*
3' .- Conidia 30-46 x 12-16 µm, 3-5 septate................................*P. clavulata*

4 .- Conidia usually with five or less septa.................................5
4' .- Conidia with more than five septa 9

5 .- Conidia papillate..6
5' .- Conidia without papilla...7

6 .- Conidiophores absent; conidia 2-3 septate,
13-22 x 6-8 µm..*P. yakuensis*
6' .- Conidiophores present; conidia 3 septate,
20-36 x 9-13 µm..*P. queenslandica*

7 .- Conidia with oblique septa, pyriform
or clavate, 12-15 x 13-18 µm...*P. terricola*
7' .- Conidia without oblique septa 8

8 .- Conidia ellipsoid and/or clavate..12
8' .- Conidia cylindrical, mostly 3-septate, 6-13 x 3-5 µm............*P. sagari*

9 .- Conidia with 10 or less septa 10
9' .- Conidia with more than 10 septa..11

10 .- Conidia cylindrical, 2-7 septate, 17-37 x 6-9 µm................*P. olivacea*
10' .- Conidia clavate to sigmoid,
3-9 septate, 13.5-49.5 x 6-11 µm.....................................*P. chambalensis*

11 .- Conidia navicular to broadly fusiform,
black to dark brown, 42-70 x 18-27 µm............................*P. venusta*
11' .- Conidia clavate, ellipsoidal to sigmoid,
reddish brown, 30-80 x 18-20 µm....................................*P. larviformis*

12 .- Conidia constricted at the septa, 16-26 x 8-11 µm..............*P. congolensis*
12'.- Conidia not constricted at the septa....................................13

13 .- Conidia ellipsoid, 2-4 septate, 15-30 x 10-14 µm................*P. indica*
13'.- Conidia clavate, 0-5 septate, 9-28.5 x 6-11.5 µm.................*P. variabilis*

ACKNOWLEDGMENTS

We gratefully acknowledge Prof. G.L. Hennebert (Université Catholique de Louvain La Neuve) for critical reading and Dr. E. Descals (Inst. Estudis Avançats de les Balears, C.S.I.C.) for serving as pre-submission reviewers and The Cuban Ministry of Agriculture for providing facilities during this work. We are also indebted to Lic. Inés M. Suárez Sarría for her assistance.

REFERENCES

Ellis, M.B. (1976). *More Dematiaceous Hyphomycetes*. Comm. Mycol. Inst., Kew., 507 pp.

Joshi, I.J., Chauhan, R.K.S. and Saksena, S.B. (1983). *Polyschema chambalensis* sp. nov. from Indian soil. *Current Science* ***52***: 220-222.

Matsushima, T. (1975). *Icones microfungorum a Matsushima lectorum*. Kobe, Matsushima.

Matsushima, T. (1989). *Matsushima Mycological Memoirs*. ***6***: 1-100, Kobe, Matsushima.

Mercado, A. and Mena, J. (1992). Nuevos o raros hifomicetos de Cuba VII. Especies enteroblásticas. *Acta Botanica Hungarica* ***37***: 63-73.

Pandeya, J.P.N. and Saksena, S.B. (1978). A new species of *Polyschema* from Indian soil. *Mycologia* ***70***: 876-879.

Rao, V. and Reddy, K.A. (1984). *Polyschema lignicola* sp. nov. *Kavaka* ***12***: 67-69.

Tiwari, D.P. and Agrawal, P.D. (1973). A new species of *Polyschema* from Indian soil. *Lloydia* ***36***: 88-90.

Tiwari, D.P., Agrawal, P.D. and Sutton, B.C. (1977). *Polyschema variabilis* sp. nov. from Indian soil. *Transactions of British Mycological Society* ***69***: 514-516.

MYCOTAXON

Volume LVII, pp. 457-462 January-March 1996

NOTES ON CONIDIAL FUNGI. IV. *HYALOPLEIOCHAETA* ANAM. GEN. NOV. AND SOME NOTES ON *PLEIOCHAETA*

R. F. Castañeda Ruíz[1], J. Guarro[2] and J. Cano[2]

[1] Instituto de Investigaciones Fundamentales en Agricultura Tropical "Alejandro Humboldt" (INIFAT) Calle 1 esq. 2 Santiago de las Vegas, Ciudad Habana, Cuba. [2] Unitat de Microbiologia, Facultat de Medicina i Ciències de la Salut, Universitat Rovira i Virgili, 43201 Reus, Tarragona, Spain.

ABSTRACT

Hyalopleiochaeta anam. gen. nov. is described and illustrated. It is distinguished by the polyblastic sympodial proliferation of conidiogenous cells and by cylindrical, septate and colorless conidia with several filiform appendages arising from subapical and suprabasal conidial cells. This new taxon with uncolored structures was found on leaf litter from Cuba. ***Camposporidium ghindense*** comb. nov. is proposed. A key to the species of the related genus ***Pleiochaeta*** is provided.

Key words: ***Hyalopleiochaeta, Camposporidium, Pleiochaeta***, tropical fungi, systematics

RESUMEN

Se describe e ilustra al nuevo género de hifomicetos ***Hyalopleiochaeta***. Se caracteriza por poseer células conidiógenas poliblásticas que proliferan en forma simpodial, conidios cilíndricos, septados e incoloros con varios apéndices filiformes naciendo de sus células subapical y suprabasal. Este nuevo taxón, con estructuras incoloras, procede de hojas en descomposición de Cuba. Se propone la nueva combinación ***Camposporidium ghindense***. Se establece una clave para la clasificación de las especies del género relacionado ***Pleiochaeta***.

Palabras clave: ***Hyalopleiochaeta, Camposporidium, Pleiochaeta***, hongos tropicales, sistemática.

Hyalopleiochaeta Castañeda, Guarro et Cano anam. gen. nov.
Etym.: L. **Hyalo**, colorless; **Pleiochaeta** (a similar genus).

Ad fungos conidiales hyphomycetes pertinens. ***Coloniae*** *effusae, albae. Mycelium partim superficiale et partim in substrato immersum.* ***Conidiophora*** *conspicua, mononemata, septata, hyalina.* ***Cellulae conidiogenae*** *polyblasticae, sympodiales, in conidiophoris incorporatae, plus minusve crassae, denticulatae, cicatricatae.* ***Conidia*** *acropleurogena, cylindrica, ellipsoidea, usque obclavata, hyalina, multiseptata, non catenata; cum appendicibus filiformibus, laevibus, hyalinis in cellula subapicale et interdum suprabasale, praedita.*

Species typica: ***Hyalopleiochaeta delicata*** Castañeda, Guarro et Cano anam.sp. nov.

Conidial fungi, hyphomycetes. Colonies spreading, white. Mycelium superficial and immersed. ***Conidiophores*** differentiated, mononematous, septate, hyaline. ***Conidiogenous cells*** polyblastic, sympodial, integrated, more or less broad, with flat-topped denticles, scarred. ***Conidia*** acropleurogenous, cylindrical, ellipsoid, to obclavate, hyaline, multiseptate, not in chains, with filiform appendages, smooth, hyaline, arising from the subapical cell and sometimes from suprabasal cell.

Hyalopleiochaeta delicata Castañeda, Guarro et Cano anam. sp. nov. Etym.: L. **delicata**, slender. Fig.1,2

Ad fungos conidiales, hyphomycetes pertinens. ***Coloniae*** *effusae, pilosae, amphigenae, albae. Mycelium partim superfiale et partim in substrato immersum ex hyphis septatis, ramosis, laevibus, hyalinis, 3-5 µm diam, compositum.* ***Conidiophora*** *conspicua, mononemata, cylindrica, eramosa, 3-8 septata, flexuosa, delicata, levia, hyalina, usque 350 µm longa, 5-7,5 µm crassa ad basim.* ***Cellulae conidiogenae*** *polyblasticae, sympodiales, terminales, in conidiophoris incorporatae, plus minusve crassae denticulatae, cicatricatae.* ***Conidia*** *acropleurogena, cylindrica, plerumque utrinque rotundata, interdum leviter cicatricata, subtruncata ad basim vel excentrica, sicca, levia, non catenata, hyalina, 67-85 x 8-10 µm; 1-3 (plerumque 3) appendicibus filiformibus, laevibus, hyalinis in cellula subapicale et interdum 1-raro 2 appendicibus in cellula suprabasale, praedita; appendicibus 40-56 µm longis et 1-1,5 µm crassis.*

Teleomorphosis ignota.

Conidial fungi, hyphomycetes. Colonies spreading, hairy, amphigenous, white. Mycelium superficial and immersed. Hyphae septate, branched, smooth-walled, hyaline, 3-5 µm diam. ***Conidiophores*** differentiated, mononematous, cylindrical, unbranched, 3-8 septate, flexuous, slender, smooth, hyaline, up to 350 µm long, 5-7.5 µm wide at the base. ***Conidiogenous cells*** polyblastic,

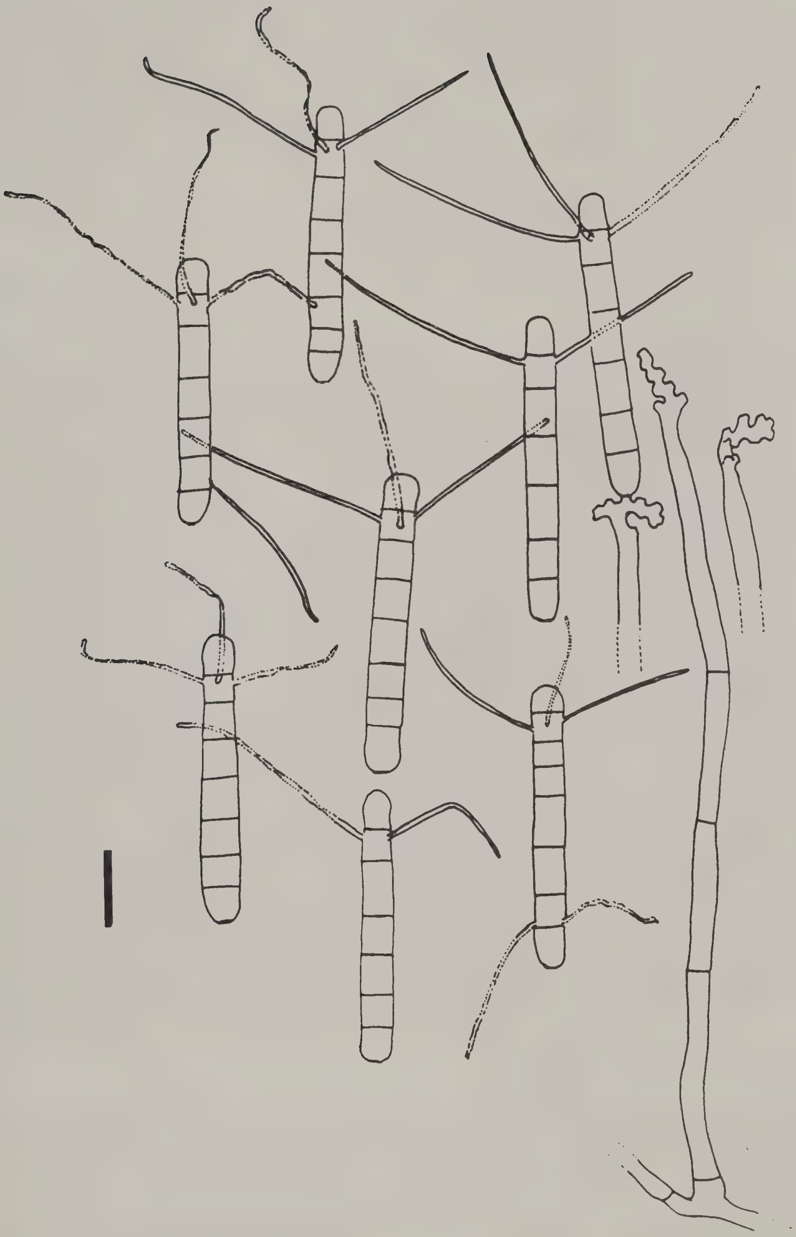


Fig. 1.- *Hyalopleiochaeta delicata* (INIFAT C94/140). Conidiogenous cells and conidia (bar = 10 µm).

sympodial, integrated, terminal, more or less broadly denticulate, scarred. ***Conidia*** acropleurogenous, cylindrical, always rounded at the ends, with slight scars subtruncate at the base, sometimes out of the center, dry, smooth-walled, not in chains, hyaline, 67-85 x 8-10 µm; always with 1-3 (mostly 3), filiform, hyaline, smooth, 40-56 x 1-1.5 µm, appendages borned at the subapical cell, and sometimes 1, rarely 2 appendages arising from suprabasal cells.

Holotype: On dead leaf of ***Buchenavia capitata***. Gran Piedra, Santiago de Cuba, Cuba. INIFAT C94/140. R.F. Castañeda, 1 Nov., 1994.
Isotype: Deposited in MUCL Culture Collection.

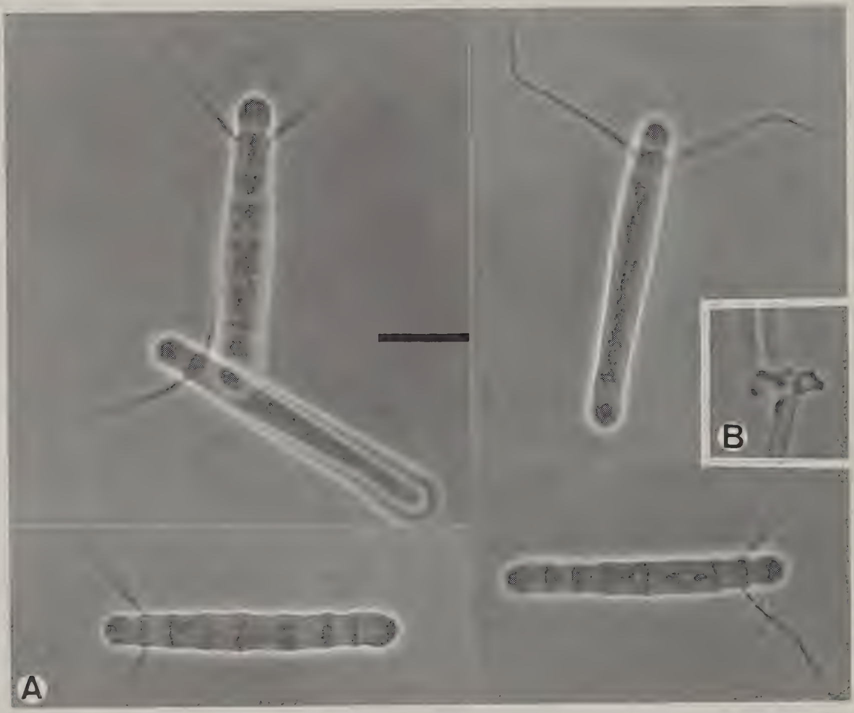


Fig. 2.- *Hyalopleiochaeta delicata* (INIFAT C94/140). Conidia and conidiogenous cell (bar = 25 µm).

The conidial appendages are the main characteristic of ***H. delicata.*** The sympodial proliferations of the conidiogenous cells in ***H. delicata*** resemble those of ***Pleiochaeta setosa*** (Kirchn.) Hughes (Ellis, 1971). The conidia in both genera secede schizolytically, but ***Pleiochaeta*** has hyphae, conidiophores and conidia pigmented, whereas all these structures are colorless in ***Hyalopleiochaeta***. In addition the appendages in ***Pleiochaeta*** come out of the apical cells and are usually branched; but in ***Hyalopleiochaeta*** they arise from the subapical and sometimes from the suprabasal cell. The genus ***Pleiochaeta*** up to the present comprised four species: ***P. setosa*** (type species) which has appendiculate, roughly cylindrical conidia, with end cells colorless and intermediate cells golden brown, multiseptate, with several appendages, up to 100 µm long, sometimes branched at the apical cell; ***P. stellaris*** Rambelli & Onofri (Rambelli *et al.,* 1981), bearing fusiform, septate and shorter conidia, with end cells hyaline and middle cell brown, and with a trifid appendage at the apical cell, 15-20 µm long; and ***P. ghindensis*** Bhat (1983). The conidia of the latter species have the characteristic features of the genus but their monoblastic, terminal and annellate conidiogenous cell proliferations clearly differ from the rest of the genus. ***P. ghindensis*** seems more related to ***Camposporidium*** Nawawi & Kuthubutheen (1988), which also shows successive proliferation of the conidiogenous cells and schizolytic conidial rupture.Therefore, the following new combination is proposed:

Camposporidium ghindense (Bhat) Castañeda, Guarro & Cano comb. nov.
Basionym: ***Pleiochaeta ghindensis*** Bhat in Transactions of the British mycological Society. 81: 405 (1983).

The fourth species of the genus is ***P. amazonensis*** Matsushima (1993), which has sympodial and sometimes percurrent conidiogenous cell proliferations. The conidia are smooth or slightly verrucose, multiseptate, cylindrical-fusiform, dark brown, up to 200 µm long, with (1-) 2 septate appendages, pale brown at the base, suhhyaline at the top, which arise from intercalary cells of the conidia; appendages up to 80 x 2-3 µm. These characteristics are rare in ***Pleiochaeta.*** Although this species is of doubtful taxonomic position, no new combination is proposed at the moment.

KEY TO SPECIES OF *PLEIOCHAETA*

1a.- Conidial appendages borne at the apical cell 2
1b.- Conidial appendages not borne at the apical cell,
    up to 80 µm long. Conidia multiseptate,
    cylindrical-fusiform, 130-200 x 7-10 µm .... ***P. amazonensis***

2a.- Conidia roughly cylindrical, 4-8 septate, 68-90 x 14-22 µm;
    appendages up to 100 µm long .... ***P. setosa***
2b.- Conidia fusiform, 2-septate, 21.5-28.8 x 3.5-4 µm;
    appendages 15-20 µm long .... ***P. stellaris***

ACKNOWLEDGEMENTS

We are indebted to Prof. G.L. Hennebert (Université Catholique de Louvain) and Dr. E. Descals (Inst. Estudis Avançats de les Balears, C.S.I.C.) for serving as pre-submission reviewers. We acknowledge the Cuban Ministry of Agriculture for facilities. We are also indebted to Miss Cristina Cabré for her assistance.

REFERENCES

Bhat D.J. 1983. An undescribed species of ***Pleiochaeta*** from Asmara, Ethiopia. **Transactions of British mycological Society** 81: 405-406.

Ellis M.B. 1971. ***Dematiaceous Hyphomycetes***. Kew, Commonwealth Mycological Institute; 608 pp.

Matsushima T. 1993. **Matsushima Mycological Memoirs**. No 7, Kobe; 290 pp.

Nawawi A. and A.J. Kuthubutheen. 1988. ***Camposporidium***, a new phragmoconidial genus of Hyphomycetes. **Mycotaxon** 32: 161-167.

Rambelli A., S. Onofri and D. Lunghini. 1981. Dematiaceous Hyphomycetes from Ivory Coast forest litter. **Transactions of the British mycological Society** 76: 53-58.

MYCOTAXON

Volume LVII, pp. 463-469 January-March 1996

NOTES ON CONIDIAL FUNGI V. TWO NEW DEMATIACEOUS HYPHOMYCETES FROM CUBA

R. F. Castañeda Ruíz[1], J. Guarro[2] and J. Cano[2]

[1] Instituto de Investigaciones Fundamentales en Agricultura Tropical "Alejandro Humboldt" (INIFAT) Calle 1 esq. 2 Santiago de las Vegas, Ciudad Habana, Cuba. [2] Unitat de Microbiologia, Facultat de Medicina i Ciències de la Salut, Universitat Rovira i Virgili, 43201 Reus, Tarragona, Spain.

ABSTRACT

Bahusakala nidutermitae anam.sp. nov. distinguished by its moniliform, one- to pluri-celled , barrel-shaped, guttulate and thallic-arthric conidia and *Matsushimaea fertilis* anam. sp. nov. characterized by profusely branched chains, of moniliform, sympodial blastic conidia, are described and illustrated. The former was found on a termite nest and the latter on plant debris, both from Cuba. The main differences of these species with related taxa are briefly discussed.

Key Words: *Bahusakala*, *Matsushimaea*, *Torula*, termites, tropical fungi, systematics

RESUMEN

Se describen e ilustran, *Bahusakala nidutermitae* anam. sp. nov. caracterizada por poseer conidios moniliformes, de unicelulares a pluricelulares, doliformes, gutuliformes, con conidiogénesis tálica y *Matsushimaea fertilis* anam. sp. nov. caracterizada por poseer conidios blásticos de origen simpodial, formando cadenas profusamente ramificadas. Las dos especies fueron aisladas en Cuba, la primera a partir de un nido de termitas y la última de restos vegetales. Las principales diferencias entre estas especies y otras relacionadas se discuten brevemente.

Palabras clave: *Bahusakala*, *Matsushimaea*, *Torula*, termitas, hongos tropicales, sistemática

Bahusakala nidutermitae Castañeda, Guarro *et* Cano anam. sp. nov.
Etym.: Latin: ***nidu***: nest. ***termitae***: refering to its presumed habitat FIG.1,2

Ad fungos conidiales, hyphomycetes pertinens. ***Coloniae*** *in nido termitae, effusae, brunneae vel olivaceae, pilosae.* ***Mycelium*** *partim superficiale et partim in substrato immersum, ex hyphis septatis, ramosis, laevibus, guttulatis, brunneis, 1.5-3.5 μm diam compositum.* ***Conidiophora*** *prostrata, inconspicua (hyphis vegetativis similia) vel conspicua, septata, ramosa, guttulata, leviter constricta ad septa, levia, brunnea.* ***Conidia*** *thallica-arthrica, catenata, ramosa, formata per disarticulationem hypharum vegetativarum in septis antea formatis, Y-formia, truncata ad fundamenta et ad apicem rotundata vel utrimque truncata, guttulata, sicca, levia, brunnea, constricta ad septa, 3-67 x 2-3,5 μm, cum 1-20 cellulis doliiformibus vel ellipsoidalibus, praedita.*

Teleomorphosis ignota

Conidial fungi, hyphomycetes. **Colonies** on natural substrate (termitae nest) spreading, brown or olivaceous, hairy. Mycelium immersed and superficial. Hyphae septate, branched, smooth-walled, guttulate, brown, 1.5-3.5 μm diam. **Conidiophore** prostrate, not differentiated (resembling assimilative hyphae) sometimes differentiated, septate, branched, guttulate, slightly constricted at the septa, smooth, brown. **Conidia** thallic-arthric, in branched chains, formed by disaticulation of differentiated hyphae at previously formed septa, Y-shaped, truncate at the base and rounded at the apex or truncate at each end, guttulate, dry, smooth-walled, brown, slightly constricted at septa, 3-67 x 2-3.5 μm, seceding singly or in series of 2 to 20 doliiform to ellipsoid cells.

Teleomorph unknown.

Habitat: On termite nest.
Holotype: CUBA. Cabo de San Antonio, Pinar del Río, on termite nest, 28 Apr. 1993, R.F. Castañeda (INIFAT C93/239).
Isotype: Deposited in MUCL Culture Collection.

The genus *Bahusakala* Subramanian (1958) comprised three species: *B. olivaceonigra* (Berk. et Br.) Subramanian, the type species, is characterized by 0-5 (mostly 1)-septate, brown or dark brown, striate to rough-walled, cylindrical conidia, with thallic-artric conidiogenesis. *B. cookei* M.B. Ellis (1976) has cylindrical to oblong, brown to dark brown, smooth or verruculose, 2-7 dark septate conidia. The third species is *B. australiensis* Matsushima (1989), featuring 0-5 septate, subhyaline to pale brown, smooth, cylindrical conidia. All three species are clearly different from *B. nidutermitae*. Two other previously described species, *B. ramosa* Castañeda (1986) and *B. longispora* Tokumasu et Tubaki (1983), have been redisposed in *Charomyces* Seifert and *Parasympodiella* Ponnappa respectively.

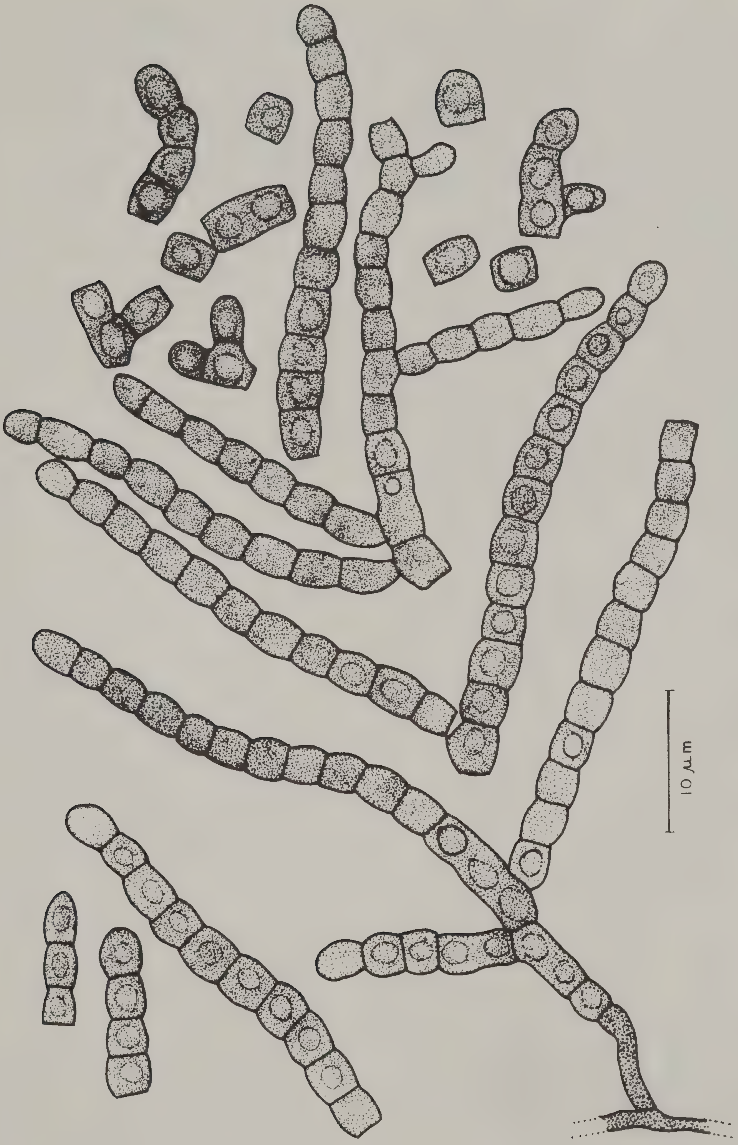


Fig. 1.- *Bahusakala nidutermitae* (INIFAT C93/239). Conidiogenous cells and conidia (bar = 10 µm).

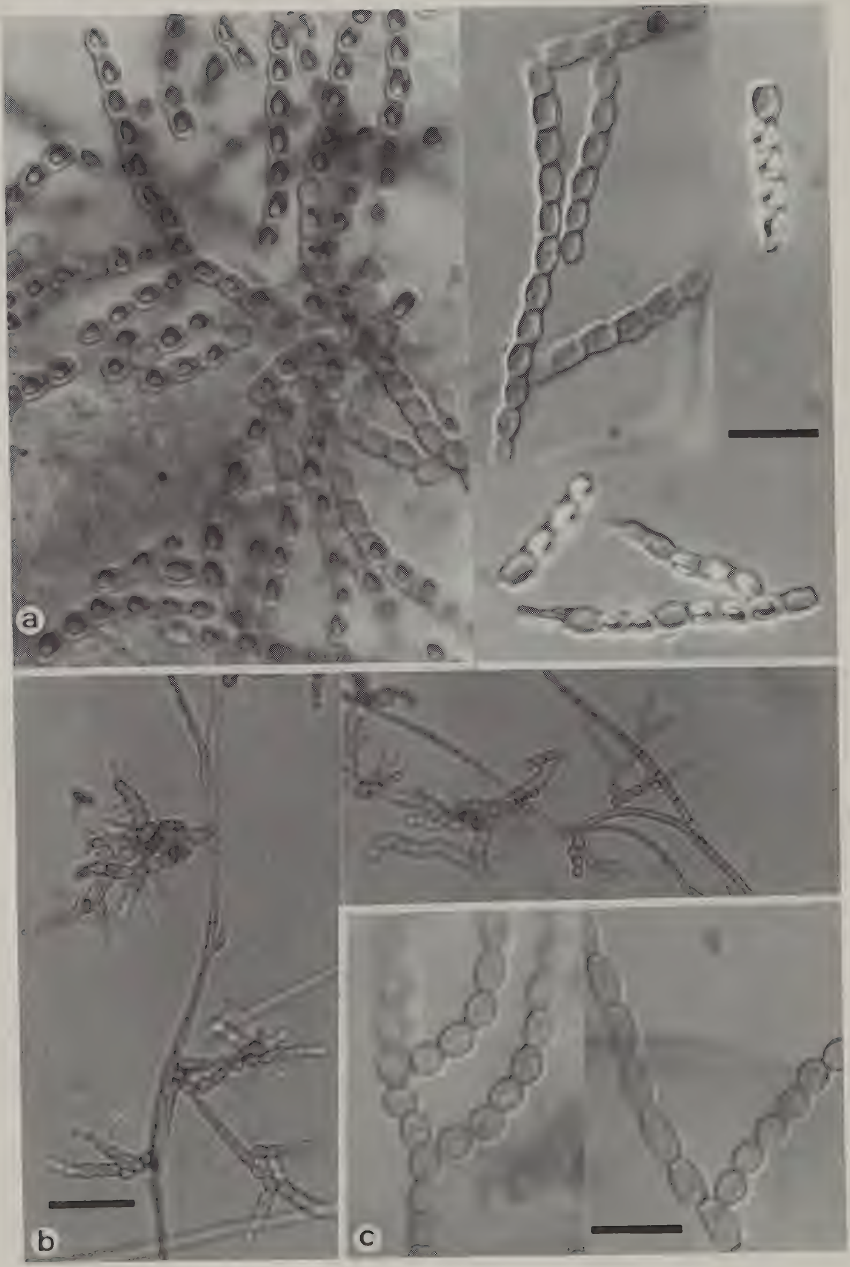


Fig. 2.- *Bahusakala nidutermitae* (INIFAT C93/239). a) Conidia (bar = 10 µm). *Matsushimaea fertilis* (INIFAT C93/204) b, Conidiogenous cells and conidia (bar = 25 µm) . c, Conidia (bar = 10 µm).

KEY TO SPECIES OF *Bahusakala*

1a.- Conidia with ornamented walls 2
1b.- Conidia smooth-walled 3

2a.- Conidia with striate walls, 5-24 x 4-6 µm. .... ***B. olivaceonigra***
2b.- Conidia with verrucose walls, 16-44 x 3-8 µm .... ***B. cookei***

3a.- Conidia cylindrical, 0-5 septate, 9-24 x 1.8-3.0 µm. ....***B. australiensis***
3b.- Conidia barrel-shaped, 0-19 septate, 3-67 x 2-3.5 µm ....***B. nidutermitae***

Matsushimaea fertilis Castañeda, Guarro et Cano anam-sp. nov.
Etym.: Latin: *fertilis*: refers to conidial production FIGS.2,3

***Coloniae** in substrato naturales effusae, amphigenae, olivaceae vel brunneae. Mycelium partim superficiale et partim in substrato immersum, ex hyphis septatis, ramosis, laevibus, brunneis, 2-4 mm diam; compositum. **Conidiophora** inconspicua, (hyphae vegetativae similes), erecta, septata, levia, brunnea. **Cellulae conidiogenae** polyblasticae sympodiales, laterales et terminales, determinatae, late denticulatae, brunneae, 5-10 x 2-5 µm. **Conidia** catenata, repetite sympodialiter ramosis, moniliformia, non-septata, olivacea usque dilute brunnea, vulgo matura integra, sicca, conidiis basalibus clavatis usque globosis, 6-7,5 x 3-4 µm. Ramuli 50-180 µm longis,*

Teleomorphosis ignota

Colonies on natural substract spreading, amphigenous, olivaceous to brown. Mycelium immersed and superficial. Hyphae septate, branched, smooth-walled, brown, 2-4 µm diam. **Conidiophores** not differentiated, erect, septate, smooth, brown. **Conidiogenous cells** polyblastic sympodial, lateral and terminal, determinate, broadly denticulate, brown, 5-10 x 2-5 µm. **Conidia** in chains, repeatedly sympodially branched, moniliform, non-septate, olivaceous to pale brown, commonly remaining entire at maturity, dry, globose to elliptical, 4-6 x 3-4 µm; basal conidia, clavate to globose, 6-7,5 x 3-4 µm. Branch 50-180 µm long.

Colonies on oat-meal agar (Difco) attaining 30-35 mm diam in 7 days at 25°C, olivaceous dark, reverse green to black-green, floccose. Vegetative mycelium composed of branched, smooth-walled, septate, 2-5.5 µm diam hyphae. **Conidiophores** inconspicuous, sometimes erect, mostly prostrate, brown. **Conidia** in chains, repeatedly branched, globose to elliptical, smooth, pale brown, 3-6 x 3-4 µm and clavate to globose, brown, smooth, basal conidia, 6-8 x 3-5 µm.

Teleomorph unknown.

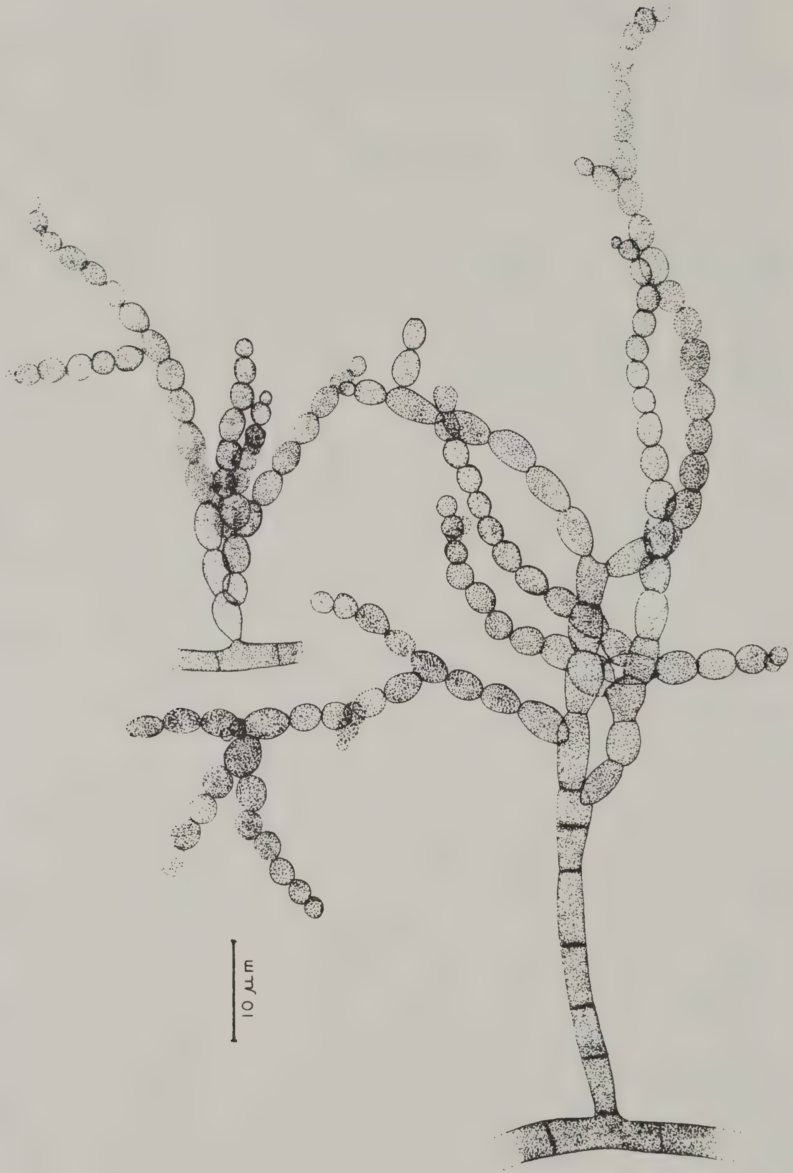


Fig. 3.- *Matsushimaea fertilis* (INIFAT C93/204). Conidiogenous cells and conidia (bar = 10 µm).

Habitat: On rotten leaf.

Holotype: CUBA. Santiago de las Vegas, Ciudad de la Habana, on rotten leaf, 3 Jan.1993, R.F. Castañeda (INIFAT C93/204).

Living cultures deposited in INIFAT (C93/204), IMI (358617) and MUCL.

Subramanian (1977) proposed *Masushimaea* with *M. fasciculata* (Matsushima) Subramanian as the type species, on the basis of *Torula fasciculata* Matsushima 1975. This genus remained monotypic and had only been recorded from Japan, on leaves of *Cinnamomum japonicum* (the type) and from Cuba on leaves of *Coccoloba uvifera* (Castañeda & Kendrick, 1991). *M. fasciculata* has repeatedly branched chains of dark brown, barrel-shaped measuring 3-4.5 x 3.5-5.2 μm conidia; the whole conidial structures are 40-50 μm wide, all these characteristics differentiate this species from *M. fertilis.*

ACKNOWLEDGMENTS

We thank Prof. G.L. Hennebert (Université Catholique de Louvain) and Dr. E. Descals (Inst. Estudis Avançats de les Balears, C.S.I.C.) for reviewing the manuscript. We are indebted to the Cuban Agriculture Ministry for facilities during this work. We are also indebted to Lic. Inés M. Suárez Sarriá for her assistance.

REFERENCES

Castañeda Ruíz, R.F. 1986. **Deuteromycotina de Cuba. Hyphomycetes IV**. Instituto de Investigaciones Fundamentales en Agricultura Tropical "Alejandro de Humboldt" 17 pp. Habana.

Castañeda Ruíz, R.F. and B. Kendrick. 1991. Ninety-nine conidial fungi from Cuba and three from Canada. **University of Waterloo Biology Series** 35: 1-132.

Ellis, M.B. 1976. **More Dematiaceous Hyphomycetes**, Commonwealth Mycological Institute, Kew, 507 pp.

Matsushima, T. 1975. **Icones microfungorum a Matsushima lectorum**. Kobe, 209 pp.

Matsushima, T. 1989. **Matsushima Mycological Memoirs**. No 7. Kobe, 100 pp.

Subramanian, C.V. 1958. Hyphomycetes-V. **Journal of the Indian Botanical Society**. **37**: 47-64.

Subramanian, C.V. 1977. Revisions of Hyphomycetes-I. **Kavaka 5**: 93-98.

Tokumasu, S. and K. Tubaki. 1983. *Bahusakala longispora* sp. nov., and its geographical distribution in the pine forests of Japan. **Transactions of the Mycological Society** of **Japan. 24**: 425-431.

MYCOTAXON

Volume LVII, pp. 471-477 January-March 1996

ENDOPHYTIC ISOLATES OF CREOSPHAERIA SASSAFRAS

Gerald F. Bills
Microbial Biochemistry and Process Research
Merck Research Laboratories
P.O. Box 2000, Rahway, New Jersey, 07065, USA

and

Fernando Peláez
Centro de Investigación Básica
Merck Sharp & Dohme de España, S.A.
Josefa Valcárcel, 38
28027 Madrid, Spain

Abstract - Identification of endophytic isolates of *Creosphaeria sassfras* was solved by morphological comparison with ascospore-derived isolates. Latent infections of woody angiosperms by *Creosphaeria sassafras* are reported for the first time. This fungus was isolated from a living twig of *Platanus occidentalis* collected in West Virginia and living twigs of *Baccharis halimifolia* collected in New Jersey. A brief account of fruiting frequency of *C. sassafras* on *Lindera benzoin* is included.

This report offers an example of how traditional collection and identifcation of fungi can help to name endophytic fungal isolates and why knowledge of vegetative and conidial states and cultural features are useful to applied researchers studying endophytes of woody plants. Disparity between methodologies often divides investigators of the taxonomy of ascomycetes and their conidial states from investigators (such as the authors) who primarily study ascomycetes of woody plants by obtaining viable isolates from living plants. Dissimilarity in methodological perspective often gives the impression, especially to non-mycologists, that endophytes and plant-inhabiting ascomycetes are distinct and exclusive groups of fungi. Witness on one hand, more than two centuries and thousands of genera and species of ascomycetes, coelomycetes, and hyphomycetes described from woody plants with limited, if any, biological information, and on the other hand, community studies of endophytes yielding long lists of isolates that are unidentifiable or only assignable to form genera. Inability to apply traditional ascomata- or conidiomata-based taxonomy often frustrates the endophyte researcher or phytopathologist, while the taxonomist may not take into account the usefulness of characters derived from *in situ* and *in vitro* study of the vegetative states of ascomycetes. However, some efforts have started to bridge this conceptual gap, e.g. (5, 9).

While investigating endophytic fungi from woody angiosperms, we isolated an unidentifiable hyphomycetous anamorph from living twigs of American sycamore (*Platanus occidentalis* L., Platanaceae) and sea myrtle (*Baccharis halimifolia* L., Asteraceae). These isolates strongly resembled species of the anamorph genus *Libertella* Desmaz. or other anamorphic states of the Diatrypales and Xylariales (2, 3, 6), or could even superficially be confused with the anamorph genera *Idriella* P. E. Nelson & Wilhem or *Microdochium* Sydow. Our first encounter with this fungus was during routine examinations of endophytic isolates. This isolate appeared extraordinary to us because of its hamate to anguilluliform conidia (Figs. 2-4) that adhered together in wet masses on simple aerial conidiophores, grayish to reddish brown pigments, and their reddish brown sclerotium-like masses of stromatic tissue in old cultures (Fig. 6). This organism was so distinctive that we immediately recognized a second isolate approximately 18 months later from among the myriads of endophytes that passed through our laboratories. Lack of diagnostic methods for most anamorphic Diatrypales or Xylariales thwarted their identification. Finally, by coincidence, we were able to identify these isolates by directly comparing them with ascospore-derived cultures of *Creosphaeria sassafras* (Schweinitz) Ju, Martín & Rogers [≡*Hypoxylon sassafras* (Schweinitz) M. A. Curtis] collected on spicebush (*Lindera benzoin* (L.) Blume, Lauraceae).

Anamorphic states of several xylariaceous fungi are frequently isolated from healthy tissues of wide variety of plant species while their ascomata are collected on a much narrower range of plants, as for example *Hypoxylon fragiforme* (Scop.) Kickx. (9). The significance of widespread latent infections of xylariaceous fungi to their life cycle strategies and interactions with host plants remains unclear, although genetically distinct endophytic races of a species may occur (11). We hope to alert those studying endophytes or xylariaceous fungi that *C. sassafras* may have a widespread endophytic phase of its life cycle and to aid its identification, we illustrate and describe these endophytic isolates.

Methods

Endophytic isolates were obtained by removing living twigs from a young tree of *P. occidentalis* and a mature shrub of *B. halimifolia*. Twigs were transported to the lab in paper office envelopes. Twigs of *P. occidentalis* were stored at 4^{0} C for about 8 weeks prior to isolation while those of *B. halimifolia* were processed the next day. Isolations were made by the procedures described by Petrini (10). Ascospores were dissected from mature ascomata of *C. sassafras* with an insect pin and individual ascospores were separated with a Skerman-type micromanipulator on cornmeal dextrose agar (from Difco, amended with 50 mg/L streptomycin sulfate, 50 mg/L chlortetracycline, and 100 mg/L chloramphenicol). Colony morphology was studied on oatmeal (OA), cornmeal (CM), yeast-malt extract (YM) agars (all from Difco). Colony descriptions were made after 21 days growth at 20^{0} C, 12 hr photoperiod under cool white fluorescent, 85% rh. Capitalized color names are from Ridgway (12). Dried culture mats and field specimens are deposited at the U.S. National Fungus Collections (BPI).

Fruiting patterns of *C. sassafras* were assessed briefly at the Ashbrook Reserve, Union Co., New Jersey, 25 March 1995. The area is a second growth swamp forest dominated by *Acer rubrum* L., *A. saccharinum* L., *Fraxinus americana* L., *Liquidambar styraciflua* L. with *Cornus amomum* Mill. and *L. benzoin* codominant in the understory. The swamp was entered perpendicular to its downward contour and *L. benzoin* clumps examined until *C. sassafras* was located. Then a meandering transect was followed northward along the swamp contour. Clumps to be assessed were selected by spotting the plant's flowers in the distance (approximately 5-30 m apart) so not to be influenced by the number of dead stems associated with the clump. The selected clump was approached and the standing dead stems of the main clump and old dead stems in the immediate area were inspected. Thirty clumps were examined. *Creosphaeria sassfras* was identified by its bright yellow to yellowish orange enterostroma.

Description of endophytic isolates of *C. sassafras*

Figs. 1-8.

Colonies on CM attaining 42 mm diam, appressed to downy, usually transparent over outer two thirds, downy and pigmented over inner one third, dry, dull, with irregular margin, hyaline to pale gray, dark olivaceous gray, Olive-Gray to Deep Olive Gray, reverse hyaline to olivaceous gray. Odor not distinct. Exudates absent.

Colonies on YM attaining 26 mm diam, floccose to felty, with margin highly irregular to lobed, pale gray, pinkish gray to brownish gray, Ecru Drab, Light-Brownish Drab, Brownish Drab, Light Drab, Drab-Gray, reverse pinkish gray to reddish brown, finally blackish brown, Bone Brown, Liver Brown. Exuding a yellowish brown to brown soluble pigment into the agar. Old agar slants on YM are entirely reddish brown.

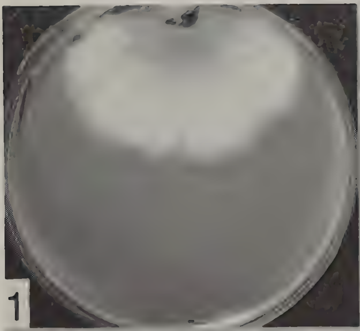
Colonies on OA attaining 55 mm, floccose to felty, hyaline at the margin, soon pinkish gray, becoming gray to dark gray, with aerial hyphae pale gray or almost hyaline and underlying hyphae strongly pigmented, reverse pinkish gray to reddish brown, finally blackish brown with formation of stromatic tissues. Exuding a yellowish brown to reddish brown soluble pigment into the agar.

Conidiophores developing within 4-6 days of inoculation, micronematous or semi-macronematous, suberect to erect, unbranched or with up to 3 branches, septate or not, up to 120 µm tall, up to 4 µm wide at the base, tapered toward the apex, arising from surface or aerial hyphae, hyaline to grayish brown, with smooth walls or with walls developing external incrustations in age. *Conidiogenous cells* holoblastic, polyblastic, integrated, terminal, sympodial and/or synchronous, hyaline to pale grayish brown, up to 120 µm long, narrowed to minutely geniculate or denticulate apices, with scars barely protuberant and unthickened, with each conidiogenous cell bearing 4-10 conidia. *Conidia* adhering in moist clusters at the apices of conidiogenous cells, simple, aseptate, thin-walled, hamate, unciform, or anguilluliform, 16-22 x 1.2-1.8 µm, eguttulate, with a slightly flattened scar at the proximal end. *Hyphae* brownish gray, incrusted, forming dark brown to black, knot-like or sclerotium-like masses in cultures >4 weeks old, with hyphal masses up to 90 µm in diam, composed of more-or-less isodiametric cells, with individual cells up 12 µm in diam.

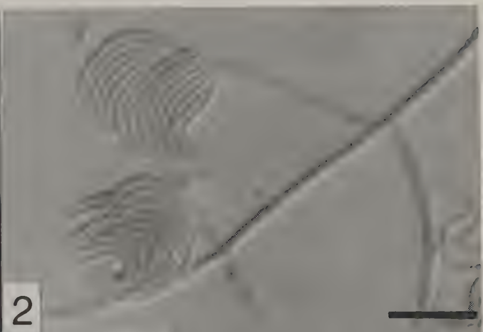
Endophytic isolates examined: USA. West Virginia. Pleasants Co., Mound Manor, isolated from living twig of *Platanus occidentalis*, 9128101F, Aug 1991. New Jersey. Ocean Co., Tuckerton Marsh, isolated from living twig of *Baccharis halimifolia*, GB3046, 15 Dec 1992.

Teleomorphic isolates examined: USA. New Jersey. Monmouth Co., Turkey Swamp Wildlife Management Area, on dead stem of *Lindera benzoin* , GB4591, 8 Jan 1995. Union Co., Ashbrook Reserve, on dead stem of *L. benzoin*, GB4588, 17 Dec 1994.

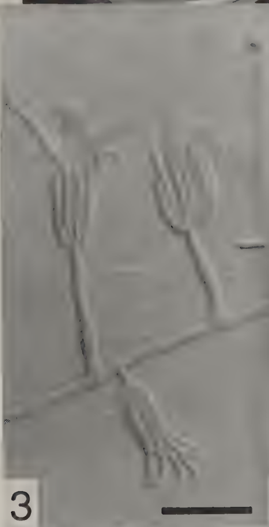
Figs. 1-8. Endophytic isolate of *Creosphaeria sassafras* from *Platanus occidentalis* (9128101F). Fig. 1. Two-week old culture mat on YM. Figs. 2-4. Young conidiophores with conidia on aerial hyphe. Bar = 20 µm. Fig. 5. Conidophore with conidium, note denticulate secession scars. Bar = 10 µm. Fig. 6. Sclerotium-like mass of stromatal tissue. Bar = 20 µm. Fig. 7. Incrusted vegetative hyphae. Bar = 10 µm. Fig. 8. Conidia. Bar = 20 µm.



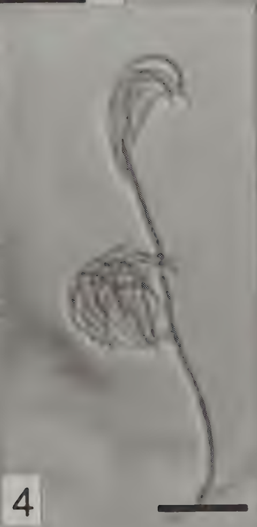
1



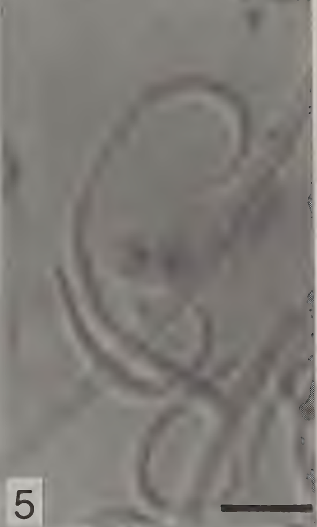
2



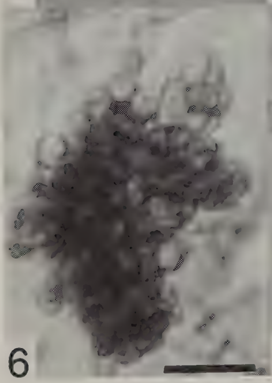
3



4

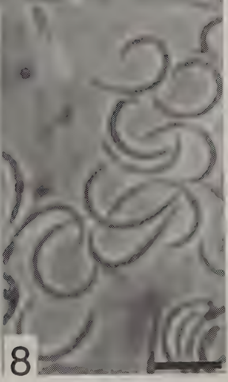


5



6

7



8

Observations and Comments

Cultures of two widely separated endophytic isolates, from previously unreported hosts, were virtually identical to ascospore-derived cultures of *Creosphaeria sassafras* collected on one of its typical eastern North American hosts, *L. benzoin* (1, 7). Furthermore, all these isolates match well the descriptions of the anamorphs of *C. sassafras* derived from teleomorphs collected in Europe (4, 8) and Asia (4). All cultures developed the aggregations of dark, isodiametric cells interpreted to be stromatal tissues in old cultures (4). Ju *et al.* (4) observed conidial germination of *C. sassafras* in culture, albeit at an extremely low germination rate (J.D. Rogers, personal communication). We failed to observe conida germination among heavy conidial suspensions of an endophytic isolate, 9128101F, and of an ascospore-derived isolate, GB4588, placed on YM and CM agars. A high percentage of ascospores germinated from ascomata collected in December and January after several weeks of freezing weather, thus suggesting ascospores survive repeated freeze/thaw cycles.

The literature indicates a widespread and patchy distribution for *C. sassafras.* A limited field survey in the Ashbrook Reserve indicated that *C. sassafras* can be locally abundant. Of 30 *L. benzoin* clumps examined, 11 (37%) had stromata or stromatal remnants associated with their dead stems. Occurrence of stromata seemed to depend on whether or not a dead main stem with bark was still associated with the bush. Stromata were observed only on corticated main stems (about 2-6 cm diam.) that were in contact with ground, except in one case where the dead stem was leaning in a snag. Old dead stems, with cracked bark, still standing in the main clump did not have stromata, nor did heavily rotted, decorticated stem fragments. The only other stromatic ascomycete observed on *L. benzoin* was one occurrence of *Hypoxylon rubiginosum* (Pers.) Fr.

Formation of erumpent ascomata of *C. sassafras* on corticated dead stems of *Lindera benzoin* and *Sassafras albidum* (Nutt.) Nees in eastern North America (7) is consistent with fruiting patterns of other endophytic species of Xylariales. Studies of the endophytic fungal communities of healthy stems of *Lindera* or *Sassafras* would be a logical starting point to determine the extent of endophytic infections by *C. sassafras*. Latent infections of twigs of other hosts along with its fruiting on non-Lauraceae hosts in Europe, Asia, and South America may indicate a widespread adaptation to the endophytic growth habit by *C. sassafras.*

In conclusion, endophytic isolates of *C. sassafras*, that by themselves defied identification, were readily recognized by comparison with isolates obtained by tradtional collecting. Practitioners of traditional ascomycete taxonomy and endophyte research will both benefit by applying the other's techniques to the study of plant-inhabiting ascomycetes.

Acknowledgments

We are grateful to Ignacio Chapela and Liliane Petrini for reviewing the manuscript and to the Editor for her helpful comments.

References

1. Farr, D. F., Bills, G. F., Chamuris, G. P., and Rossman, A. Y. 1989. Fungi on Plant and Plant Products in the United States. American Phytopathological Society Press, St. Paul.
2. Glawe, D. A., and Rogers, J. D. 1982. Observations on the anamorphs of six species of *Diatrype* and *Diatrypella*. Can. J. Bot. 60: 245-251.
3. Glawe, D. A., and Rogers, J. D. 1986. Conidial states of some species of Diatrypaceae and Xylariaceae. Can. J. Bot. 64: 1493-1498.
4. Ju, Y.-M., San Martín Gonzalez, F., and Rogers, J. D. 1993. Three xylariaceous fungi with scolecosporous conidia. Mycotaxon 47: 219-228.
5. Lodge, D. J., and Laessøe, T. 1994. Three host-specific *Xylaria* speces. Mycologia 86: 436-466.
6. McKemy, J. M., Glawe, D. A., and Munkvold, G. P. 1993. A hyphomycetous synanamorph of *Eutypa armeniacae* in artifical culture. Mycologia 85: 941-944.
7. Miller, J. H. 1961. A monograph of the world species of *Hypoxylon*. University of Georgia Press, Athens, U.SA.
8. Petrini, L. E., and Müller, E. 1986. Haupt- und Nebenfruchtformen europäischer *Hypoxylon*-arten (Xylariaceae, Sphaeriales) und verwandter Pilze. Mycol. Helv. 1: 501-627.
9. Petrini, L. E., and Petrini, O. 1985. Xylariaceous fungi as endophytes. Sydowia 38: 216-234.
10. Petrini, O. 1986. Taxonomy of endophytic fungi in aerial plant tissues. *In* Microbiology of the Phyllosphere. *Edited by* N. J. Fokkema and J. van den Heuvel. Cambridge University Press, Cambridge, U.K. pp. 175-187.
11. Petrini, O., Sieber, T. N., Toti, L., and Viret, O. 1992. Ecology, metabolite production, and substrate utilization in endophytic fungi. Natural Toxins 1: 185-196.
12. Ridgway, R. 1912. Color Standards and Nomenclature. Published by the author, Washington, D.C., U.S.A.

MYCOTAXON

Volume LVII., pp. 479-485 January-March 1996

A NEW SPECIES OF *LACHNUM*

ON *SPARTINA ALTERNIFLORA*

SHARON A. CANTRELL, RICHARD T. HANLIN

Department of Plant Pathology
University of Georgia
Athens, Georgia 30602-7274 USA

and

STEVEN Y. NEWELL

Marine Institute, The University of Georgia
Sapelo Island, Georgia 31327, USA

ABSTRACT

Lachnum spartinae is described as a new species of *Lachnum* (Hyaloscyphaceae) occurring on *Spartina alterniflora* (smooth cordgrass) from the salt marsh ecosystem of Sapelo Island, Georgia, USA. It forms apothecia on the standing dead shoots of *S. alterniflora* after or during cold rainy spells. It is believed to be part of the fungal community involved in the decomposition process of the cordgrass.

Key words: Ascomycotina, discomycetes, Leotiales, Hyaloscyphaceae

INTRODUCTION

The salt marsh cordgrass, *Spartina alterniflora* Loisel., is very common on both the Atlantic and Gulf coasts of the United States. The importance of this grass in salt marsh ecosystems lies in its primary production and as a habitat for fish and shellfish (Dame, 1989). As it ages, standing *S. alterniflora* is first invaded by parasitic fungi and later by saprobic terrestrial and marine fungi, which are summarized by Gessner and Kohlmeyer (1976). Newell (1993) reviewed the importance of fungi in the decomposition process of smooth cordgrass. The more important fungi involved in this process are members of the Ascomycotina, including

Phaeosphaeria spartinicola Leuchtmann, *P. halima* (Johnson) Shoemaker & Babcock and *Buergenerula spartinae* Kohlm. & Gessner.

Since October, 1985 one of us (SYN) has observed a small apothecial ascomycete occurring on the upper two thirds of the standing-dead shoots of *S. alterniflora* in three localities on Sapelo Island, Georgia, USA. This apothecial ascomycete was determined to be a species of *Lachnum*, which is described in the present paper.

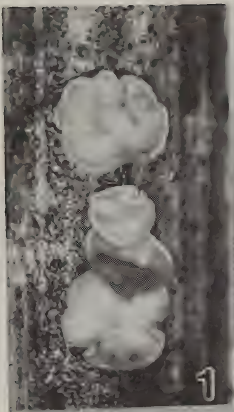
The genus *Lachnum* Retz. (=*Dasyscyphus* S. F. Gray, Hyaloscyphaceae, Discomycetidae, Ascomycotina) is characterized by having granulated hairs and lanceolate paraphyses and is widely distributed on many types of substrates. Some species occurring on grasses, rushes and sedges are *Lachnum palearum* (Desm.) Massee, *Lachnum apalum* (Berk. & Br.) Nannf., *Lachnum controversum* (Cooke) Rehm, *Lachnum tennuissimum* (Quel.) Raitv. and *Lachnum caricis* (Desm.) Höhn (Dennis, 1981, Raitviir, 1970, Spooner, 1987). Because the characteristics of our fungus differ from these and other described species, it is herein described as new.

MATERIALS AND METHODS

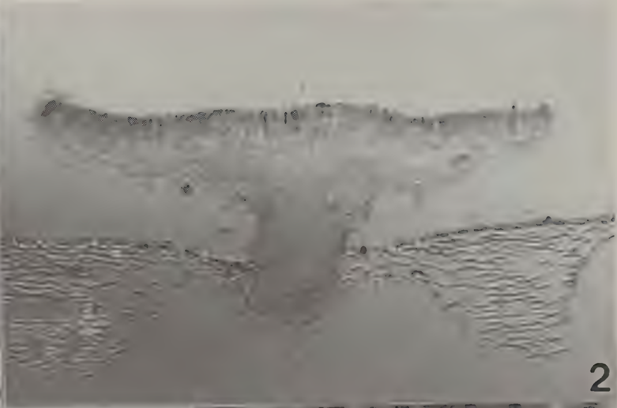
All microscopic measurements were made from fresh and dried material. Fresh material was mounted in water and Melzer's Reagent. Dried material was rehydrated in KOH and semipermanent mounts were prepared in lactophenol. Isolates were obtained by spore drop onto water agar and germinated spores were transferred to malt extract agar (MEA).

For paraffin sections, fresh apothecia were fixed in FPA (formalin, 5 ml; propionic acid, 5 ml; 70% ethanol, 90 ml). The material was dehydrated through a tertiary butyl alcohol series and embedded in paraplast. Sections 8 µm thick were cut on a rotary microtome and affixed to standard microscope slides with Haupt's adhesive. The paraplast was removed in xylene and the sections were hydrated, mordanted in iron alum for 2 hr, stained in 0.5% Heidenhain's hematoxylin for 2 hr and differentiated in aqueous picric acid for 18.5 min. Permanent mounts were made with Canada balsam.

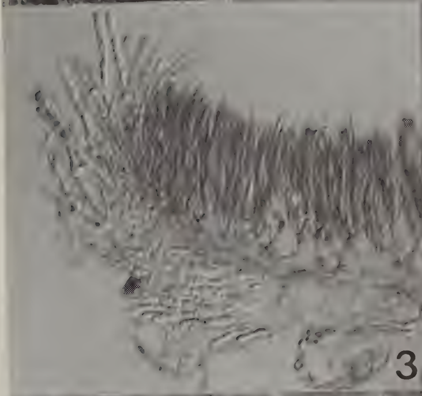
Figures 1-6. *Lachnum spartinae*. 1. Apothecia on natural substrate, 17.5x. 2. Section through apothecium, 63x. 3. Section through hymenium and excipulum, 150x. 4. Excipulum, 577x. 5. Ectal excipulum, 928x. 6. Medullary excipulum, 625x.



1



2



3

4

5

6

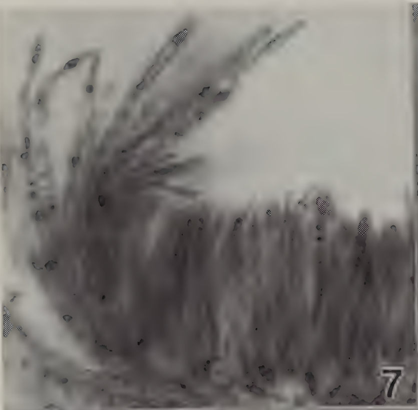
SPECIES DESCRIPTION

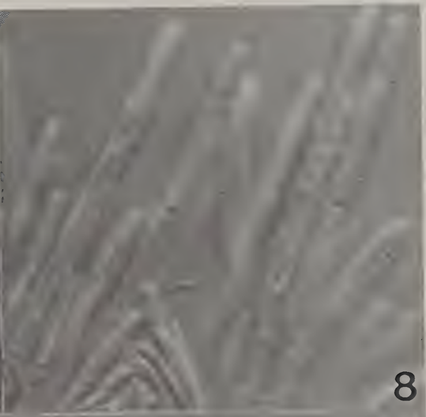
Lachnum spartinae Cantrell, sp. nov.

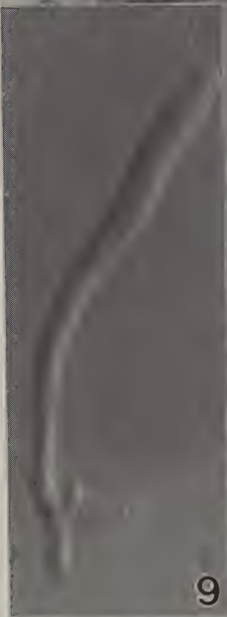
Apothecia (Figs. 1-3) 0.5-2 mm diametro, dispersa vel gregaria, superficiaria, brevistipitata, juventute concava, maturitate plana. Discus concavus vel planus, aureus aut viridi-flavus, in sicco umbrinus. Receptaculum cupulatum, pilis flavis margine fere albis in sicco umbrinis vestitum. Stipes centralis, cylindraceus, brevissimus, diametro disci brevior, basi fuscatus, pilosus. Pili (Fig. 8) 46-67.5 X 2.7-3.6 [x̄=55.4 X 3] µm, hyalini, tenuiter tunicati, cylindracei, obtusi, septati, ubique subtiliter granulati. Asci (Figs. 7, 9-11) 40-55 X 3.6-4.5 [x̄=45 X 4.4] µm, 8-spori, cylindracei, basi angustata, apice hemisphaerice vel conice, poro in Solutione Melzeri caeruleo, poris materiae siccatae debiliter reagentibus. Ascosporae (Fig. 13) 6.3-10.4 X 1.4-1.8 [x̄=8.2 X 1.7] µm, hyalinae, cylindraceae, extremis rotundatis, rectae vel allantoideae, non septatae, guttulis oleosis parvis duabus. Paraphyses (Figs. 11-12) lanceolatae, 1.8-3.2 µm diametro, hyalinae, longitudine ascos 5-15 µm superantes. Excipulum ectale (Figs. 4-5) ex textura prismatica tenuiter tunicata constans. Excipulum medullosum (Figs. 4, 6) ex hyphis parallelis texturae porrectae constans.

Apothecia (Figs. 1-3) 0.5-2 mm diam, scattered or gregarious, superficial, short-stipitate, concave when young, plane when mature. Disc concave to plane, golden yellow to greenish yellow, becoming umber when dried. Receptacle cupulate, clothed with yellow hairs that are almost white at the margin, turning umber color when dried. Stipe central, cylindric, very short, less than the diameter of the disc, dark at the base, hairy. Hairs (Fig. 8) 46-67.5 X 2.7-3.6 [x̄=55.4 X 3] µm, hyaline, thin-walled, cylindrical, obtuse, septate, finely granulate throughout. Asci (Figs. 7, 9-11) 40-55 X 3.6-4.5 [x̄=45 X 4.4] µm, 8-spored, cylindric with tapered base, apex hemispherical to conical, pore blue in Melzer's Reagent, dried material with a weak pore reaction even with KOH pretreatment. Ascospores (Fig. 13) 6.3-10.4 X 1.4-1.8 [x̄=8.2 X 1.7] µm, hyaline, cylindrical, with rounded ends, straight or curved, nonseptate, with two small oil droplets. Paraphyses (Figs. 11-12) lanceolate, 1.8-3.2 µm diam, hyaline, exceeding the asci in length by 5-15 µm. Ectal excipulum (Figs. 4 & 5) composed of thin-walled textura prismatica. Medullary excipulum (Figs. 4 & 6) of thin parallel hyphae of textura porrecta.

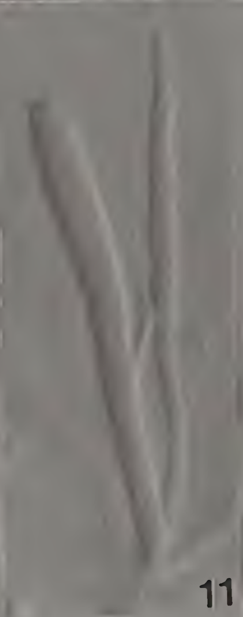
Figures 7-13. *Lachnum spartinae*. 7. Section of hymenium with young and mature asci, 550x. 8. Hairs, 812x. 9. Young ascus, 1029x. 10. Mature ascus with ascospores, 1050x. 11. Mature ascus showing amyloid reaction and paraphysis, 1192x. 12. Lanceolate paraphysis, 1250x. 13. Ascospores, 1250x.


7

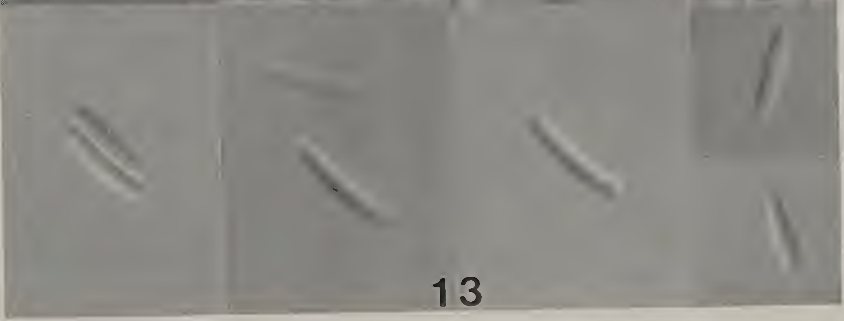

8


9

10


11

12


13

Characteristics in culture: Colony slow-growing (approx. 1 mm/day) on malt extract agar at 25 °C, cream color, composed of appressed to floccose mycelium. No conidial anamorph observed.

Habitat and distribution: On decaying leaf sheaths of smooth cordgrass, *Spartina alterniflora* Loisel. *Lachnum spartinae* is, to date, known only from the type locality.

Specimens examined: USA: Sapelo Island, Georgia, on standing-dead shoots of *Spartina alterniflora* (RTH 1078), Dec. 1993. Other collections Cantrell (Ga 41), Sapelo Island, GA, Oct. 1994 and Cantrell (Ga 42), Sapelo Island, GA, Oct. 1994.

Type: USA, Sapelo Island, Georgia (RTH 1078), December 1993. Holotype deposited at the Plant Pathology Herbarium, University of Georgia (GAM 12887), isotype deposited at the New York State Museum Herbarium (NYS).

Etymology: Referring to the host genus, *Spartina*.

DISCUSSION

The presence of granulated hairs, lanceolate paraphyses and ectal excipulum of thin-walled textura prismatica place this species in the genus *Lachnum*. Among the specimens examined there is variability in color of the apothecia and size of the asci and paraphyses. The collections made in October, 1994 are somewhat different in the color of the apothecia, being greenish yellow rather than golden yellow when fresh and drying to yellow-brown. These collections also contain larger asci and paraphyses (aprox. 10 µm longer). But these differences do not justify the creation of either a new species or variety and are taken as variation at the population level.

Lachnum spartinae is not the only species within the genus that can occur in grasses and related plants, but it is unique in its morphological characteristics. *Lachnum palearum*, which is reported to occur on *Spartina townsendii* (a hybrid between *S. alterniflora* and *S. maritima*), differs from *L. spartinae* in having a white hymenium and somewhat thick-walled brown hairs with yellow lumps. A very close species occurring on *Phragmites* spp., *L. controversum,* possesses broadly lanceolate paraphyses (3.5-4.5 µm diam) and smaller apothecia (<1 mm diam) whereas *L. spartinae* possesses narrowly lanceolate paraphyses (1.8-3.15 µm) and bigger apothecia. These two species also differed in the color of the dried apothecium, which is reddish brown with a pinkish tint in *L. controversum* and umber in *L. spartinae*. *Lachnum apalum* is another species very common on grasses in temperate regions but it possesses white apothecia and long cylindric ascospores, which makes it quite different from *L. spartinae*. *Lachnum tennuissimum* and *L.*

carici differ from *L. spartinae* in the color of the apothecium, which is cream-white and long stipitate in the former two.

Lachnum spartinae is a member of the fungal community that occurs on the standing dead sheaths of *S. alterniflora*. It appears late in the succession of fungi from October to November after or during cold (5-15°C) rainy spells. The dead shoots of *S. alterniflora* fall to the marsh floor in early spring soon after the occurrence of *L. spartinae*. It is likely then that this species plays an important role in the decomposition of the most recalcitrant, lignocellulosic portions of *Spartina* shoots in the saltmarsh ecosystem (see Newell et al., 1995).

In culture this species produces slow growing colonies on MEA, even if *Spartina* stems are placed on top of the medium and at cold temperature (10-15°C). No anamorph has been observed. After 2 months small white aggregations of mycelium are observed, some of which develop into apothecia. The apothecium in culture is not typical, being multiple apothecia clumped together, whereas they are always formed singly on the natural substrate. But these are fertile, producing normal hairs, asci, ascospores and paraphyses. In culture this species produces biologically active, oxygen-rich secondary metabolites which are structurally novel (J. Gloer, personal communication). Thus, *Lachnum spartinae* is a species of both basic-ecological and potentially applied interest.

ACKNOWLEDGEMENTS

The authors wish to thank Dr. Duane A. Kolterman, Department of Biology, University of Puerto Rico, Mayagüez, PR, for translating the description into Latin. The helpful comments of reviewers J. H. Haines and D. H. Pfister also are much appreciated.

LITERATURE CITED

Dame, R. F. 1989. The importance of *Spartina alterniflora* to Atlantic coast estuaries. Rev. Aquat. Sci. 1:639-660.

Dennis, R. W. G. 1981. British Ascomycetes. J. Cramer, Germany.

Gessner, R. V. and Kohlmeyer, J. 1976. Geographical distribution and taxonomy of fungi from salt marsh *Spartina*. Can. J. Bot. 54:2023-2037.

Newell, S. Y. 1993. Decomposition of shoots of a salt-marsh grass. In: Advances in Microbial Ecology, Vol. 13, J. G. Jones (ed). Plenum Press, New York, p. 301-326.

Newell, S. Y., Porter, D. and Lingle, W. L. 1995. Lignocellulolysis by ascomycetes (Fungi) of saltmarsh grass (smooth cordgrass). Microsc. Res. Techn. (In press).

Raitviir, A. 1970. Synopsis of the Hyaloscyphaceae. Scripta Mycol. 1:1-115.

Spooner, B. M. 1987. Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae. Bibliotheca Mycologica 116:1-711.

MYCOTAXON

Volume LVII, pp. 487-493 January-March 1996

BOOK REVIEWS

D. S. Hibbett, Book Review Editor

Flora Agaricina Neerlandica Vol. 3, edited by C. Bas, Th. W. Kuyper, M. E. Noordeloos, and E. C. Vellinga. 285 x 220 mm, 183 pp, 1995. A. A. Balkema, Postbus 1675, NL-3000 BR Rotterdam, The Netherlands. US $39.- ISBN 9054106174 - paperback; $70.- ISBN 9054106160 - clothbound.

The third contribution in this excellent series again features a general part, which includes an unillustrated glossary, a brief explanation of the scope and methods, and a new list of abbreviations of both the authors' names and the bibliographic citations covered in the current issue. These chapters have varied in coverage in each volume, with the illustrated glossary in Vol. 1 still the most complete. The taxonomic part is devoted to 39 genera in 12 Tricholomataceae tribes. What is impressive about this flora is the quality, standardization, and forethought which has gone into the planning and execution of each volume. All genera and species are richly annotated, thoroughly investigated, and well illustrated by line drawings. As a rule, taxonomic decisions are explained, controversy addressed, and pragmatic approaches adopted without being unduly conservative. Consequently, the contributors are maintaining standards toward which we all should aspire.

A few noteworthy typesetting errors require correction. Under *Clitocybe*, p. 42, parts of two sentences are missing causing the discussions on *Ossicaulis lignatilis* and *Pseudoomphalina pachyphylla* to run together. Under *Rimbachia*, figs. 136 and 137 have their captions reversed. *Rimbachia bryophila* has lamellae not *R. arachnoidea*. On p. 176 the authority for *Catathelasma imperiale* is given as "(Fr. Quél.) Sing." but what was intended was *C. imperiale* (Fr.→Quél.) Sing. The importance of the arrow, which is missing, is explained in Vol. 1, p. 51. Similarly, the authority for *Marasmiellus rosellus* on p. 126 should have an arrow rather than a dash and an apostrophe, as printed.

The authorities for *Armillaria tabescens* (Scop.:Fr.) Emel and *A. ectypa* (Fr.:Fr.) Emel, both 1921, need correction to that given here (see **A Nomenclatural study of Armillaria and Armillariella species**, by T. J. Volk & H. H.

Burdsall, 1995). Also, it is unclear as to why *Crinipellis scabellus* is not named *C. stipitarius*, an acknowledged sanctioned species epithet, now that the two are synonymized.

Whereas in Vol. 2 there is a key to the tribes of the Tricholomataceae, in Vol. 3 there is a new key to genera independent of their tribe affiliations. Significantly, different character pairs are used in the first few couplets of both keys. Other noteworthy decisions and concepts in Vol. 3 are as follows. *Dermoloma* was previously listed in the Tricholomateae in Vol. 2 but is now placed in the Hygrocybeae. *Armillaria* is accepted over *Armillariella* following recent trends to reject R. Singer's classification. *Clitocybe*, still one of the larger genera (34 species), includes as a synonym *Singerocybe,* which was characterized by physalids, but excludes species with either amyloid or roughened spores such as belong in *Pseudoclitocybe* or *Lepista*. Notably, the name *Clitocybe dealbata* which has long been linked to poisonings, is rejected in favor of *C. rivulosa* and *C. augeana*. *Leucopaxillus*, with only two species, is notable for its paucity of species in the Netherlands. The delimitation of *Omphalina* and the names for lichenized species, here treated as *Phytoconis*, are, to say the least, controversial, as much because of my involvement as that of others. Unfortunately the name *Phytoconis*, because of objections primarily by lichenologists, has been nomenclaturally rejected, so the use of the agaric names is still unstable. *Pseudoomphalina*, here represented by *P. pachyphylla*, should be characterized by the presence of amyloid spores, but the spores of this species have been reported by several authors to be inamyloid, so this feature requires independent confirmation. *Collybia*, with 23 species, includes as a synonym *Rhodocollybia*. Notably, *Collybia amanitae*, which was proposed by Kreisel in 1987 and then overlooked by many, is here accepted as correct for *C. cirrhata*.

Other comprehensively treated Dutch genera in the Tricholomataceae were *Arrhenia*, *Callistosporium*, *Campanella*, *Cantharellula, Catathelasma, Cyphellostereum, Fayodia, Flammulina, Gamundia, Haasiella, Hohenbuehelia, Hygrophoropsis, Laccaria, Macrocystidia, Marasmiellus, Micromphale, Myxomphalia, Omphaliaster, Omphalotus, Ossicaulis, Panellus, Pseudobaeospora, Resupinatus, Rhodotus, Rickenella*, and *Ripartites*. Several other major genera of Tricholomataceae remain untreated.

Flora Agaricina Neerlandica is essential for libraries on agaric taxonomy. It should also be consulted by amateur groups seeking guidance based on carefully weighed options. It is a scholarly publication in the finest tradition. *Scott A. Redhead, Centre for Land and Biological Resources Research, Ottawa, Ontario, K1A 0C6, Canada.*

Mushrooms of North America in Color: a field guide companion to seldom-illustrated fungi, by Alan E. Bessette, Orson K. Miller, Jr., Arleen R. Besette, and Hope H. Miller. 215 x 132 mm, 172p., 75 colored plates, 1995. Syracuse University Press, 1600 Jamesville Avenue, Syracuse, NY 13244-5160, U.S.A. Tel.: (315) 443-5547. ISBN 0-8156-0323-1. US $17.95.

This identification aid to the fleshy fungi of North America is an interesting addition to the literature on this subject. The information presented is useful and the format is certainly pleasing. One might only wish perhaps, that a significantly larger number than 73 species would have been included in this text. The stated objective of the authors was to present "selected species which are uncommon, rare, or not well illustrated in the current literature" and therefore to "provide an extension of the popular field guides already available throughout North America." **Mushrooms of North America in Color** does a wonderful job of beginning to fulfill that objective.

The contents are separated into seven parts: a list of species illustrated by color photographs, a preface, acknowledgments, the species descriptions and illustrations, a glossary, works cited, and an index. The species descriptions are arranged alphabetically (mostly) by the taxonomic rank of order, then families within each order, and lastly by genera and then species. Thus the Agaricales, family Amanitaceae, genus *Amanita*, species *armillariiformis* is the first entry; while Tulostomatales, Calostomataceae, *Calostoma lutescens* should be the last entry, except that the Phallales and Pezizales are to be found as the last two entries. This kind of taxonomic presentation is novel in terms of the typical handbook, but I think quite useful from an educational standpoint. The section on Agaricales includes 11 families with 48 species, the Aphyllophorales contains 6 families with 14 species, the Lycoperdales covers 2 families with 3 species, the Pezizales covers 2 families with 3 species, and the Hymenogastrales, Phallales, Sclerodermatales, Tremellales, and Tulostomatales each illustrate 1 family with 1 species each. There are no keys or any other form of identification guides to allow one to determine orders, families, genera or species. This manual was not meant to be a stand-alone work.

Each species is characterized on two facing pages, a format I find particularly pleasing because of its clean, uncluttered appearance and ease of use. The description begins with the order and then family names in the upper left hand corner on the first page. A very high quality color photograph of each species, occupying from a third to a half of the beginning page of the descriptions, comes next. Two descriptions include more than one photograph to emphasize important features. The majority of these nicely composed portraits show several specimens at different developmental stages in their natural habitats. Species names, including synonyms and complete bibliographic citations, are situated directly below the illustrations. The accepted name is in bold face print, thus drawing the eye quickly and conveniently to it. The written descriptions basically consist of five parts: macroscopic features, microscopic features, fruiting data, including information on habitats, distribution and phenology, edibility, and observations. The authors use an interesting mix of non-technical and discipline-specific terminology in order to produce characterizations that are easy to understand, but which also provide an acceptable level of accuracy. The descriptions are clear and concise, and the glossary should help the uninitiated with the more technical terminology. There are no illustrations of microscopic characters. The discussions in the observation section provide the reader with a valuable synopsis of the key features for each species, and also distinguish similar looking taxa where appropriate. It is quite obvious that a microscope is often, but not always, necessary to distinguish many of these similar taxa. One new species, *Ramicola americana* Horak & Miller, is included, but will be described elsewhere. Also, one comb. nov. (as stat. nov.) was validly made: *Leucopholiota decorosa* (Peck) Miller, Volk & Bessette.

The fungi illustrated in this work are found in various areas in the continental United States, Alaska and Canada, with a only a few distributions cited for Mexico. It appears that the Pacific Northwest, the Rocky Mountains and surrounding areas, and the eastern seaboard of the Unites States and Canada received the best coverage in this current work. Only a few taxa are listed from the Gulf Coast and the southwestern United States. Thus, several sequels to this series will be possible, for two important reasons: 1) There are still extensive areas in North America which more than likely have their own unusual or even indigenous mycotas, and these area are clearly underrepresented in the current field guides. 2) As pointed out by the authors in the Preface, only about 2000 of the estimated 5000 species of mushrooms (I assume they are including all fleshy Basidiomycetes and Ascomycetes in this loosely defined category) in North America have ever been illustrated with color photographs. The present contribution of 73 species is a mall, but important step in an effort to document the wealth of fleshy fungi of North America.

Should this handsomely illustrated field guide be on your bookshelf or in your laboratory? No question about it; this aid to seldom depicted fungi will be a useful resource and I predict that my copy will be well used over the years. I hope this was not a one-time effort, and that future editions contain two or three times the number of taxa. *Timothy J. Baroni, Department of Biological Sciences, State University of New York-College at Cortland, Cortland, NY, 13045, U.S.A.*

The Fungi, by M. J. Carlile and S. C. Watkinson. Paperback, 190 x 245 mm, 482 pp., 1994 (reprinted in 1995). Academic Press, 15 East 26th Street, 15th Floor, New York, NY, 10010, U.S.A. Tel.: (800) 321-5068. Fax: (800) 336-7377. E-mail: ap@acad.com. ISBN 159960-4 (paperback), 159959-0 (clothbound). US $39.95 paperback; $75.00 clothbound.

Mycology draws together a diversity of pure and applied fields, including evolutionary biology, ecology, population biology, cell biology, physiology, genetics, and pathology. Whereas zoologists and botanists have largely partitioned their disciplines, mycologists, and mycology textbooks, are often required to cover all aspects of fungal biology. **The Fungi** is presented as an introductory mycology text, and as such it treats all of the major areas of mycology listed above, but it does not attempt to cover them all with equal depth. In the Preface, the authors claim to adopt a "microbiological" perspective, emphasizing fungi which are either economically important or are typical research organisms that can be grown in pure culture. The main text begins with a brief introductory chapter on "The fungi as a major group of organisms," followed by chapters on "Fungal diversity, Fungal cells and vegetative growth, Spores, dormancy and dispersal, Genetic variation and evolution, Saprotrophs and ecosystems, Parasites and mutualistic symbionts," and finally "Fungi and biotechnology." The main strength of this book lies in its coverage of dynamics of fungal growth and nutrition, as well as biotechnology and fermentation applications. The chapters on fungi in ecosystems focus on nutritional modes and substrate specificities and again have a physiological and biochemical slant. Thus, this text could be appropriate for a mycology course that emphasizes fungal cell biology, physiology, and biotechnology, as well as fungal nutritional modes and the functioning of fungi in ecosystems. It will also be a useful, concise resource for instructors who wish to bring these topics into their general mycology or biology courses.

The Fungi suffers, however, from a weak treatment of fungal systematics, and this will limit its utility for introductory mycology courses. Even though this text is not centered on taxonomy, it is nonetheless comparative in its approach to the subjects that it does emphasize. An understanding of fungal diversity and the rough outlines of fungal phylogeny should be an underpinning of such an approach. Alas, the coverage of fungal systematics is too brief and in some instances too muddled to give students the necessary background. For example, on p. 9-10 the kingdom Fungi is defined as consisting of "Eumycota and Myxomycota," including the cellular and plasmodial slime molds. In addition, the "three classes of true fungi in which most species produce motile cells" are said to include the "Oomycetes, the Chytridiomycetes, and a less important class" (presumably the Hyphochytriomycetes). Granted, the authors indicate elsewhere, that Myxomycetes, Oomycetes, and Hyphochytriomycetes are not close relatives of the "true" fungi, but these organisms are repeatedly referred to as "fungi," which will be a source of confusion for students. In numerous other regards the systematics used in this text and outlined in an Appendix are out of date. The references at the end of the "Fungal diversity" chapter include essentially no primary literature sources in molecular systematics, despite the impact of such studies on fungal taxonomy. This is disappointing for a text published in 1994. Admittedly, a discussion of the impact of molecular techniques on fungal systematics appears in the section "Classification, phylogeny and evolutionary trends" in the fifth chapter, but why it is so far removed from the taxonomic material in the second chapter, to which it is clearly relevant, is a mystery. The citation of outmoded DNA base composition and DNA-DNA hybridization studies as among "the main approaches currently being utilized" is inaccurate.

In conjunction with primary literature, **The Fungi** could be a useful text for an advanced mycology course dealing with applied mycology or fungal physiology. Ideally, students in such a course would already have been introduced to fungal taxonomy. It is increasingly rare, however, to find mycology courses in undergraduate curricula, and thus it is likely that this text will be used mostly by students who have no prior experience with fungi. Indeed, the authors state in the Preface that **The Fungi** is aimed at contemporary biology students, the majority of whom have had training in molecular biology and biochemistry, but not organismal mycology. By highlighting interesting and potentially useful aspects of fungal biology, this text promises to convince such students of the importance of fungi. It will not, however, give them an understanding of how the fungi, and their diverse properties, have evolved. *D.S.H.*

Fungi of Switzerland, Volume 4, Agarics 2nd Part, by J. Breitenbach and F. Kränzlin (English translation by V. L. Waters and J. F. Waters). Hardcover, 215 x 285 mm, 368 pp., 1995. Edition Mykologia Lucerne, P. O. Box 165, CH-6000, Lucerne 9, Switzerland. Tel.: (0041) 0-41-420-76-20. Fax: (0041) 0-41-420-14-21. E-mail: jbreitenbach@mus.ch. Chfr. 158.-

The series **Fungi of Switzerland**, of which this is the fourth volume, has been characterized throughout by excellent photographs combined with anatomical illustrations and full descriptions of all species. The present volume is the second part of the treatment of agarics, including the families Entolomataceae, Pluteaceae, Amanitaceae, Agaricaceae, Coprinaceae, Bolbitiaceae, and Strophariaceae (following Moser's taxonomy). The Boletales, Hygrophoraceae, Tricholomataceae, and lamellate Polyporaceae were covered in volume 3. Future volumes will treat the Cortinariaceae and Russulales. As in the preceding volumes, this book is lavishly produced in a large format, with heavy, glossy paper that enhances the photographs. An innovation in this volume is the use of color tiles representing spore-prints. These are used both in the key and individual taxon descriptions. The methods for the color reproductions of spore-prints, using a color scanner and Macintosh computer, are described in the Introduction. Also included in the Introduction are comments on macrochemical reactions particular to the taxa included in this volume (others were described in volume 3), as well as protocols for observations and preparation of reagents. Comments on the genera supplement the individual species descriptions. Terms not defined in volume 3 are included in a Glossary. There are also illustrations of cystidia shapes and hyphal pigmentation patterns to aid identification. The entrance key uses the spore-print colors, along with certain macromorphological characters. The couplets are generally very clear in the subsequent keys, which employ macromorphological and anatomical characters. The main body of the book includes the 465 species descriptions. Each species is presented in the same format as in the preceding volumes (with the addition of the spore-print colors). The name, synonyms, habitat notes, macroscopic and microscopic features, remarks, and a list of material examined are on one page, with anatomical drawings, a color photograph, and spore-print replica on the facing page. This beautiful, information-rich volume will be treasured by amateur and professional mycologists alike. *D.S.H.*

Errata, Volume 56

page 36	line 7	*for* crechqueraltii	*read* crechqueraultii
	line 38	*for* ecorded	*read* recorded
	line 42	*for* correect	*read* correct
page 38	line 4	*for* gattun	*read* Gattung
	line 14	*for* X	*read* IX
	line 15	*for* texonomic	*read* taxonomic
	line 17	*for* underscribed	*read* undescribed
	line 29	*for* ittelleuropa 1). Beitrage zur Kuntniss de Pilze Mitteleurupas	*read* Mitteleuropa (I). Beiträge zur Kenntniss der Pilze Mitteleuropas
	line 47	*for* Oribiliaceae.	*read* Orbiliaceae,
page 40	line 23	delete cfr.	
page 512	line 1	*for* crechqueraltii	*read* crechqueraultii

The page that follows [p. 496] completes the article published in volume 56: 175-180. Insert between pp. 178 and 179.

Microscopically the strongly dextrinoid skeletal hyphae combined with rather small coloured spores with a prominent ornamentation on the inner wall spores are good diagnostic characters. All in all, it should be easy to recognize this species both in the field and in microscopical preparations.

GANODERMA LEUCOCREAS Pat. & Har. Fig. 2
Bull. Soc. Mycol. Fr. 28:281, 1912.

The following description is based on the type (Loanga, Congo, 1905, coll. unknown) in the Farlow herbarium.

Basidiocarp annual, centrally stipitate; pileus round, centrally slightly depressed, 7 cm in diameter, 4 mm thick in the centre, upper surface black and shiny with a thin black cuticle, concentrically zonate; stipe 10 cm long, cylindric, black and shiny; pore surface cream to pale ochraceous, pores 6-7 per mm; tubes 2 mm deep, pale cream; context 2 mm thick, pale cream.

Hyphal system dimitic; generative hyphae 2-4 µm in diam, with clamps; skeletal hyphae hyaline, 3-6(8) µm wide, strongly dextrinoid in Melzer's reagent; pileus cuticle consisting of a palisade of vertical hyphal ends of generative hyphae, individual apical cells, clavate, thick-walled, brown, 45-60 x 12-15 µm; basidiospores yellow, oblong ellipsoid, inner wall with prominent ornamentation, 9-11 x 6-7 µm.

DISCUSSION

When comparing the two descriptions, one is struck by the similar macromorphology of the two species. The centrally stipitate basidiocarps are identical and so is the black shiny laccate surface on stipe and pileus. The colour of the pore surface, tubes and context is identical in the two species and so is the strong dextrinoid reaction of the skeletal hyphae. The latter reaction is unusual in Ganoderma and was first reported from G. nigrolucidum (Reid 1974). Thus, it clearly indicates a close relationship between G. hildebrandii and G. leucocreas.

The size and shape of the apical hyphal cells (pilocystidia) in the pilear cuticle are different in the two species. However, one may wonder whether the bulbous thin-walled cells of the G. hildebrandii specimen from Liberia, really are in an early stage in their development and that they finally will stretch and become thick-walled as seen in the type of G. leucocreas. Also the basidiospores of G. leucocreas are considerably larger than those of G. hildebrandii.

Author Index, Volume Fifty-Seven

Abraham, T. K. see Vrinda, Pradeep, Joseph and Abraham
Altés, A. see Moreno, Kreisel and Altés
Aparecida de Jesus, Maria Contribution to the Knowledge of Wood-Rotting Fungi in Brazil. II. Checklist of Fungi from Maracá Island, Roraima State. 323-328
Arambarri, A. M., and M. N. Cabello *Circinella lacrymispora* sp. nov. A New Mucoral Isolated from Argentine Soils. 145-149
Bandala, Victor M. see Montoya, Bandala and Guzmán
_____ see Montoya and Bandala
Bellú, F. see Llistosella and Bellú
Bills,Gerald F., and Fernando Peláez Endophytic Isolates of *Creosphaeria sassafras* . 471-477
Braun, U. see Crous and Braun
Cabello, M. N. see Arambarri and Cabello
Cantrell, Sharon A., Richard T. Hanlin, and Steven Y. Newell A New Species of *Lachnum* on *Spartina alterniflora.* 479-485
Castañeda Ruiz, R. F., J. Guarro and J. Cano Notes on Conidial Fungi. III. An Interesting Species of *Polyschema* from Cuba. 451-456
_____**, J. Guarro and J. Cano** Notes on Conidial Fungi. IV. *Hyalopleiochaeta* anam. gen. nov. and Some Notes on *Pleiochaeta.* 457-462
_____**, J. Guarro and J. Cano** Notes on Conidial Fungi. V. Two New Dematiaceous Hyphomycetes from Cuba. 463-469
Castellano, Michael A. and J. J. Muchovej Truffle-Like Fungi from South America: *Hysterangium* sensu lato. 329-345
Castillo A., C. Illana and G. Moreno *Badhamia melanospora* Speg. a Species Wrongly Described. 163-170
Chaudhary, Ritesh K., Sanjay K. Singh and Gareth Morgan-Jones Notes on Hyphomycetes. LXXI. New Species of *Stenella, Stenellopsis,* and *Tretospora* from Nepal. 201-209
Courtecuisse, R., G. J. Samuels, M. Hoff, A. Y. Rossman, G. Cremers, S. M. Huhndorf and S. L. Stephenson Check-List of Fungi from French Guiana. 1-85
Cremers, G. see Courtecuisse, Samuels, Hoff, Rossman, Cremers, Huhndorf, and Stephenson
Crous, P. W. and U. Braun Cercosporoid Fungi from South Africa. 233-321
Elix, John A. see Øvstedal, Elix, Smith
Guzmán, Gastón see Montoya, Bandala and Guzmán
Hafellner, J. see Navarro-Rosinés and Hafellner
Hallenberg, Nils, and Kurt Hjortstam Four New Species of Corticioid Fungi (Basidiomycotina, Aphyllophorales) from Argentina. 117-123
Hanlin, Richard T. see Cantrell, Hanlin and Newell
Henssen, Aino see Tretiach and Henssen
Hibbett, D. S. Book Review. 486-493
Hjortstam, Kurt see Hallenberg and Hjortstam
Hoff, M. see Courtecuisse, Samuels, Hoff, Rossman, Cremers, Huhndorf, and Stephenson
Huhndorf, S. M. see Courtecuisse, Samuels, Hoff, Rossman, Cremers, Huhndorf, and Stephenson
Hyde, Kevin D. Fungi from Palms. XXIV. The Genus *Bondiella* . 347-352
_____ Fungi from Palms XXV. *Pestalosphaeria elaeidis.* 353-357
_____ see McKenzie and Hyde
Illana, C. see Castillo, Illana and Moreno
Joseph, A. Vijaya see Vrinda, Pradeep, Joseph and Abraham
Kimbrough, James W. see Maia, Yano and Kimbrough
Kokwaro, J. O. see Mibey, Kokwaro and Mukunya

Kreisel, H. see Moreno, Kreisel and Altés
Llistosella, J., and F. Bellú *Lactarius mediterraneensis,* a new species from the Mediterranean Region. 175-186
Maia, Leonor C., Adriana M. Yano and James W. Kimbrough Species of Ascomycota forming Ectomycorrhizae. 371-390
McKenzie, E. H. C., and K. D. Hyde Index of Fungi Described from the Pandanaceae. 125-143
Mibey, R. K., J. O. Kokwaro and D. N. Mukunya Four New Species and Some New Records of Meliolaceous Fungi from Kenya. 87-95
Montoya, Leticia, Victor M. Bandala and Gastón Guzmán New and Interesting Species of *Lactarius* from Mexico Including Scanning Electron Microscope Observations. 411-424
_____ **andVictor M. Bandala** Additional New Records on *Lactarius* from Mexico. 425-450
Moreno, G. , H. Kreisel and A. Altés *Calvatia complutensis* sp. nov. (Lycoperdaceae, Gasteromycetes) from Spain. 155-162
_____ see Castillo, Illana and Moreno
Morgan-Jones, Gareth, and Ryan A. Phelps Notes on Hyphomycetes. LXIX. Concerning *Sporidesmium maclurae* and its synonym *Cercospora maclurae*, the Causal Organism of Leaf-Blotch of Osage Orange *(Maclura pomifera)* , Reclassified in *Pseudocercospora.* 187-194
_____ see Srivastava and Morgan-Jones
_____ see Chaudhary, Singh and Morgan-Jones
Muchovej, J. J. see Castellano and Muchovej
Mukunya, D. N. see Mibey, Kokwaro and Mukunya
Navarro-Rosinés, P., and J. Hafellner *Lichenostigma elongata* spec. nov. (Dothideales), a Lichenicolous Ascomycete on *Libothallia* and *Aspicilia* Species. 211-225
Newell, Steven Y. see Cantrell, Hanlin and Newell
Øvstedal, Dag O., John A. Elix and Ronald I. Lewis Smith A New Species of *Parmelia* (Lichenized Ascomycotina) from the Antarctic. 151-153
Peláez, Fernando see Bills and Peláez
Phelps, Ryan A. see Morgan-Jones and Phelps
Pradeep, C. K. see Vrinda, Pradeep, Joseph and Abraham
Rees, Bettye J., and A. E. Wood The Genus *Phaeocollybia* in South East Australia. 97-116
Rossman, A. Y. see Courtecuisse, Samuels, Hoff, Rossman, Cremers, Huhndorf, and Stephenson
Samuels, G. J. see Courtecuisse, Samuels, Hoff, Rossman, Cremers, Huhndorf, and Stephenson
Simmons, Emory G. *Alternaria* Themes and Variations (145-149). 391-409
Singh, Sanjay K. see Chaudhary, Singh and Morgan-Jones
Smith, Ronald I. Lewis see Øvstedal, Elix, Smith
Srivastava, Neeraj, and Gareth Morgan-Jones Notes on Hyphomycetes. LXX. A New of *Melanographium* from India, with Comments on the Genus. 195-200
Stephenson, S. L. see Courtecuisse, Samuels, Hoff, Rossman, Cremers, Huhndorf, and Stephenson
Stoppini, Anna Maria see Tirillini and Stoppini
Tretiach, Mauro, and Aino Henssen *Paulia caespitosa* sp. nov. and *P. wrightii* comb. nov. (Lichinaceae, Ascomycotina). 359-369
Tirillini, Bruno, and Anna Maria Stoppini Coumarins Distribution in Four Truffle Species. 227-232
Vrinda, K. B., C. K. Pradeep, A. Vijaya Joseph and T. K. Abraham A New *Inocybe* (Cortinariaceae) from Kerala State, India. 171-174
Wood, A. E. see Rees and Wood
Yano, Adriana M. see Maia, Yano and Kimbrough

INDEX TO FUNGOUS AND LICHEN TAXA, VOLUME FIFTY-SEVEN

This index includes the names of genera, infrageneric taxa, species, and infraspecific taxa. New names are in **boldface**, as are the page numbers on which new taxa are proposed.

Acanthonischkia 32, 69
  macrobarbata 32, 77
Acanthophyscium 324
Acremoniella
  atra 136
Acremonium 127
  atrum 136
Acrodictys 7, 69
  bambusicola 7, 73
Acrostroma 7, 69
  annellosynnema 7, 73, 84
Aecidium 66, 69
  cordiae 66, 74
Agaricus 60, 67-69
  albolutens 67, 73
  alborubellus 67
  anthocephalus 135-136
  campestris 67, 74
  collecticus 67, 74
  cubosporus 67, 74
  cultriger 67, 74
  fulvipes 67, 75
  gastrodes 67, 75
  griseolutescens 67, 76
  griseorubens 67, 76
  haematochrous 67, 76
  hortensis 67, 76
  hortulanus 67, 76
  intermedius 185
  ixodes 59
  leptopilus 67, 77
  mirabilis 67, 77
  oenochrous 67, 78
  pectinatus 55
  pilosiuscula 67, 78
  sequatorius 67, 79
  spodoides 67, 80
  umbellula 67
Agrocybe 54, 69
  broadwayi 54, 74
  pediades 67, 78
  praecox 67, 78
Ailographum
  intricatum 130
  pandani 130
Aleuria 42, 69
  phlyctidospora 42, 78
Aleurodiscus 324
  aurantium 324, 328
Alternaria 188, 391-392, 398, 406-407, 409
  arbusti 406
  brassicicola 406, 408
  cassiae 406
  cetera 391, **393**, 395-396, 398
  citri 406
  dauci 406-407
  euphorbiae 398
  euphorbiicola 400-410
  helianthinficiens 406
  incomplexa 391, **394**, 396-397
  infectoria 396
  obtecta 391, 398, 404-406
  panax 406
  protenta 406
  pseudorostrata 391, **398**-401
  rostellata 391, **401**-403
  tropica 406
  zinniae 406
Amauroderma 47, 69, 82, 325
  auriscalpium 47, 73
  omphalodes 47, 78
  rugosum 47, 79
  schomburgkii 47, 79
Amenighiella 85
Amphisphaeria 16, 69, 85
  striatispora 16, 80
Amylascus
  herbertianus 377
Angelina 40, 69
  leprieurin 41, 77
Annellolacinia
  pandanicola 139
Antennaria 69
  tropica 67, 80
Anthostomella
  calocarpa 130, 134
  lucens 130
  pandani 130, 135
Antrodiella 326
  overholtsii 326
Aphelaria 46, 69
  guadeloupensis 46, 76
  tropica 46, 80
Apiocamarops 17, 69
  alba 17, 73, 83-84
Aplosporella
  pandanicola 136
Appendiculella 87
  calostroma 91
  caseariicola 90
  mauensis 87-**88**, 89

[Appendiculella] **rubi** 87, 89-**90**
Aquascypha 49, 69
  hydrophora 49, 76
Arachnocrea 18, 69
  scabrida 18, 79
Arcyria 69
  cinerea 6, 74
  denudata 6, 75
  insignis 6, 76
Arthridium 7, 69
  arundinarius 7, 73
Arthrinium 196
Arthrobotryum
  puttemansii 275
Ascospora
  phomatoides 67, 78
Aspicilia 211-212, 219
  caesiocinerea 219
  calcarea 215-216, 219
  cernohorskiana 219
  cheresina 219
  contorta
    ssp. contorta 219
    ssp. hoffmanniana 219
  gibbosa 219
Asteridiella 87, 93-94
  aguariae 87, 91
  ehretiae 93
  mathengeiana 87, **91**-93
  nuxiae 87, 93-94
  scabra 94
  trichocladi 87, 92, **94**
Asterina 69
  labecula 67, 76
  pandani 130-131
Asterostroma
  cervicolor 325
  musicolum 326
Asterotus 64, 69
  dealbatus 64, 75
Astrocystis 35, 69
  mirabilis 35, 77
Astrosphaeriella 13, 69
  minoensis 13, 77
  stellata 13, 80
  tornata 13, 80
  trochus 14, 80
  vesuvius 14, 80
Athelia 46, 69
  rolfsii 46, 79
Athelopsis
  glaucina 118
  virescens 117-118
Auerswaldia 9, 69
  examinans 9, 75
  merrillii 126, 128
  pandani 130
Aulacostroma
  palawanense 130
Aulographum
  intricatum 130
  pandani 130
Auricularia 44, 69
  auricula-judae 67, 73
  delicata 44, , 75
  fuscosuccinea 44, 75
  mesenterica 67, 77
  polytricha 44, 78, 327

Bactrodesmium 451
Badhamia 168, 170
  capsulifera 166
  fasciculata 142
  gracilis 163, 165-166, 168-170
    var. melanospora 163, 168-**169**
  grandispora 169
  macrocarpa 166
  melanospora 163-166, 168-169
Bahusakala 463-464, 467
  australiensis 464, 467
  cookei 464, 467
  longispora 464, 469
  nidutermitae 463-**464**, 465-467
  olivaceonigra 464, 467
  ramosa 464
Bakeromyces
  philippinensis 130
Balladynopsis
  negrii 208
  vanderystii 208
Balsamia
  magnata 376
  nigrens 376
  platyspora 376
  vulgaris 376
Barssia
  oregonensis 376
Batcheloromyces 240, 244, 300, 320-321
  proteae 238, 300
Batistia 16, 69
  annulipes 7, 16, 73, 84
Berlesiella 10, 70
  fungicola 10, 75
Bertia 32, 70
  moriformis 32, 77
    var. latispora 33, 77
Bipolaris
  sorokiniana 407
Bisporella 41, 70
  discedens 41, 75
Boletinus 55, 70
  decipiens 55, 75
Boletus 340
Bondiella 347-348, 350
  palmicola 347-350
Boninogaster

[Boninogaster] phalloides 131
Botryobasidium
  obtusisporum 324, 328
  pandani 131
Botryosphaeria 9, 70
  corticis 9, 74
  disrupta 9, 75
  quercuum 9, 79
Botrytis
  olivacea 137-138
Boudiera
  tracheia 376
Bovista
  bicolor 162
Brachysporium
  pulviniforme 303
Buergenerula
  spartinae 480
Byssosphaeria 11, 70
  erythrinae 11, 75
  jamaicana 11, 76
  rhodomphala 11, 79
  schiedermayriana 11, 79
  villosa 12, 80

Calocera 44, 53, 70
  coralloides 44, 74
  cornea 67, 74
  delicata 67, 75
  glossoides 67, 76
Calonectria 18, 70
  colhounii 18, 74
  kyotensis 18, 76
Calosphaeria 17, 70
  micromeria 17, 77
Calvatia 155-156, 162
  sect. Gastropila 160
  bicolor 155, 158, 160, 162
  complutensis 155-**156**, 158, 160-162
  pachyderma 158, 160-162
  pilula 160
Calyculosphaeria 33, 70
  calyculus 33, 74
  collapsa 33, 74
Camarops 17, 70
  biporosa 17, 73, 83
  flava 83-84
  scleroderma 17, 79, 83-84
  ustulinoides 17, 80, 83-84
Camillea 35, 70, 83
  bacillum 38
  bilabiata 35, 73
  cyclisca 35, 75
  cyclops 35, 75
  fossulata 35, 75
  heterostroma 35, 76
    var. macrospora 35, 77
  labellum 35, 76
  leprieuri 36, 77
  mucronata 36, 77
  obularia 36, 78
  scriblita 36, 79
  tinctor 36, 80
Camptomeris 240, 245, 312, 317
  albizziae 311-312
  verruculosa 234, 311-313
Camposporidium 457, 461-462
  ghindense 457, **461**
Cantharellus 46, 61, 70
  guianensis 46, 76
Capillaris
  oligocarpa 137-138
Capronia 10, 70
  parasitica 10, 78
Caripia 46, 70
  montagnei 46, 77
Catenularia
  velutina 129
Catilla
  pandani 131
Cenangium
  aequinoctiale 67, 73
Cenococcum 373-374
  geophilum 374, 387-388
  graniforme 374, 389-390
Centrospora 319
Ceraceomerulius
  rubicundus 324, 328
Ceratiomyxa 3, 70
  fruticulosa 3, 75
  sphaerosperma 3, 79
Cercoseptoria 194, 319
  capsellae 253
  handelii 276
  laserpitii 295
  pini-densflorae 297
Cercospora 188, 194, 200, 240, 246, 255-257, 260, 269, 318-321, 280, 293, 300, 302-303
  agerati 295
  agryrolobii 249
  albomaculans 253
  amadelpha 284
  amaranti 251
  amygdali 307
  andropogonis 308
  anthelmintica 250
  apii 234, 248
    var. carotae 255
    var. pastinacae 294
  arachidicola 234, 248
  arachidis 296
    var. macrospora 248
  asparagi 234, 249
  atricincta 315
  avicularis 249

[Cercospora] balladynae 249
  barrasii 309
  batatae 309
  bauhiniae 249
  betae 250
  beticola 234, 250
  bidentis 234, 251
  bloxami 252
  bolleana 251
  brachiata 234, 251
  brachycarpa 251
  brassicae 253
  brassicae-campestris 252
  brassicola 234, 252
  byliana 252
  caffra 279
  canescens 236, 253
  caricina 254
  caricis 235, 254-255
  carotae 235, 248, 255
  caryae 234, 256
  cassavae 276
  cassinopsidis 235, 256
  cassiocarpa 287
  cearae 277
  cerasella 257
    var. avium 257
  chardoniana 258
  chenopodii 268
  chenopodiicola 250
  cichorii 235, 257
  cichorii-intybi 257
  circumcissa 257
  citrullina 237, 257
  clerodendri 258
  clerodendricola 258
  cocculi 259
  coffeae 260
  coffeicola 235, 260
  columnaris 275
  commelinicola 260
  commelynae 235, 260
  consobrina 307
  corchori 235, 261
  corynelioides 265
  coryneoides 264
  cruciferarum 238, 260
  cruenta 261
  cucurbitae 257
  curtisiae 261
  cyperi 255
  cyperi-fusci 255
  cyperi-rotundri 255
  delicatissima 263
  demetrioniana 235, 263
  difformis 313
  dissotidis 265
  dolichi 261
  dovyalidis 268
  dubia 268
  echii 236, 268
  egenula 268
  emicis 310
  epicoccoides 269
  eucalypti 269
  fici 272
  flagelliformis 250
  formosana 272
  fuckelii 264
  fusca 264
  fusimaculans 272
  garbiniana 307
  gomphrenicola 300
  gossypina 236, 272
  graminis 273
  granuliformis 240, 274
  guliana 307
  haemanthi 236, 276
  halleriae 276
  handelii 276
  helianthi 236, 276
  henningsii 276
  herrerana 260
  heteromalla 239, 278
  horiana 305
  insulana 237, 239, 278
  ixeridis-chinensis 282
  jaguarensis 251
  judaica 265
  kiggelariae 279
  kikuchii 236, 279
  kiusana 313
  koepkei 280
  lactucae 282
  lactucae-indicae 282
  lactucae-sativae 282
  lantana-aculeatae 272
  leoni 265
  leonotidis 237, 281
  liebenbergii 281-282
  longipes 280
  longispora 282
  longissima 237, 250, 282
  luffae 258
  lupinicola 237, 282
  lussoniensis 309
  maclurae 187-188, 190
  manihotis 277
  maylayensis 236, 283
  medicaginis 237, 283
  melaena 283
  melanochaete 284
  microstigma 254
  momordicae 258
  mucunae-capitatae 309
  mucunae-ferrugineae 309

[Cercospora] musae 284
  myrti 284
  myrticola 284
  mysoriensis 298
  neovignae 261
  nicotianae 237, 285
  oblecta 285
  occidentalis 287
    var. cassiocarpa 287
  oliniae 288
  omphacodes 288-290
  oryzae 237, 291
  pachycarpi 291
  padi 257
    var. mahaleb 257
  pallidissima 293
  panici 272
  panici-miliacei 272
  paraguayensis 269-270
  pareirae 293
  pastinaca 294
  pastinacae 294
  paulensis 287
  perfoliati 295
  persicariae 295
  personata 296
    var. cassiae occidentalis 287
  petuniae 238, 296-297
  phaseolina 275
  phaseolorum 261
  phlogina 288-290
  physalicola 297
  physalidis , 238, 297
  piaropi 238, 297
  pistiae 238, 297
  pini-densiflorae 297
  plantaginella 297
  plantaginis 238, 297
  pouzolziae 298
  preisii 293
  pretoriensis 236, 298, 300
  protearum
    var. leucadendri 301
  pruni-persicae 257
  pseudarthriae 301
  pseudokalanchoes 237, 302
  psychotriae 302
  psychotriicola 302
  punctiformis 303-304
  purpurea 304
  raciborskii 261, 285
  resedae 239, 304
    var. legionensis 304
    var. luteae 304
    var. mahonensis 304
  rhapontici 239, 305
  rhoicissi 305
  riachueli 305
  richardiaecola 305
  richardiicola 240, 305
  ricinella 239, 306
  roesleri 264
    f. fuckelii 264
  rosae 306
  rosaecola 306
    var. undosa 306
  rosae-indiananensis 306
  rosicola 306
  rosigena 306
  rubi 307
  rubro-tincta 307
  saccardiana 284
  schiffnerulae 249
  scitula 308
  sechii 257
  septorioides 307
  sesami 235, 238, 308
  solani-melongenae 268
  somalensis 287
  sorghi 235, 308
    var. cymbopogonis 308
    var. maydis 308-309
  sororiae 274
  sphaeroidea 287
  spinaciae 250
  spinacicola 250
  staticis 278
  stizolobii 309
  stuhlmannii 275
  sycina 251
  texensis 282
  timorensis 309
  transvaalensis 309
  tremae 267
  trematis 267
  trematis-guineensis 267
  trichosanthis 257
  tripolitana 236, 309-310
  vaginae 310
  verbeniphila 310
  vignae 261
  vignae-sinensis 261
  vignicaulis 253
  vincetoxici 303
  violae 240, 313
    var. minor 313
  violae-tricoloris 313
  viticola 314
  vitis 314
  withaniae 314
  zeae-maydis 240, 315
  zinniae 240, 315
  zizyphi 315
Cercosporella 240, 243, 263, 319
  albomaculans 253
  brassicae 253

[Cercosporella] cardariae 254
  conringiae 254
  coorgica 295
  crambes 254
  delicatissima 263
  ekebergiae 236, 269
  eremodauci 295
  goldbachiae 254
  gossypii 273
  herpotrichoides 277
  hypoestis 236, 278
  isatidis 254
  litvinoviae 254
  malcolmiae 254
  nesliana 253
  pastinacae 294
  physospermi 295
  raphanistri 253
Cercosporidium 274, 287, 318
  cassiocarpum 287
  dubium 268
  graminis 273
  henningsii 277
  personatum 296
Cercosporina 257
  cichorii 257
  insulana 278
  kikuchii 279
  occidentalis 287
  petuniae 296
Cercosporiopsis 253
  canescens 253
  viticolum 314
Cercostigminia 233, 240, 244, 252, 282, 287
  leucadendri 301
  leucospermi 300
    var. protearum 300
  liebenbergii 238, 271, **281**
  protearum
    var. hakeae 236, 300
    var. leucadendri 237
    var. protearum 237
Ceriporia 50, 70
  spissa 50, 79
Cetraria 153
Ceuthospora 139
  olivacea 139
  pandani 139
Chaetocalathus 57, 70
  liliputianus 57, 77
Chaetopsina 7, 70
  polyblastiae 7, 78
Chaetospermum 7, 70
  elasticae 7, 75
Chaetosphaerella 34, 70
  phaeostroma 34, 78
Chaetosphaeria 34, 70
  aotearoae 127
  fusispora 34, 75
  innumera 34, 76
  myriocarpa 34, 77
  pannicola 35, 78
Chalarodes
  bisetis 129
  obconica 129
Chamaeota 62, 70
  subolivascens 62, 80
Charomyces 464
Cheilaria
  melanoplaca 67, 77
Chlamydomyces
  palmarum 196
Chloridium
  hippotrichoides 137-138
Chlorophyllum 54, 70
  molybdites 54, 77
Choiromyces 386
  magnusii 380
  meandriformis 380
  venosus 380
Circinella 145-146, 148-149
  angarensis 148
  chinensis 145-146, 148
  indica 146
  lacrymispora 145-**146**, 148
  linderi 145
  minor 148
  mucorioides 145, 148
  muscae 148
  naumovii 148
  rigida 148
  simplex 146, 148
  umbellata 148
Cladophialophora 240, 244, 318
  kellermanianum 237, 239, 278
Cladosporium
  ampelinum 314
  berkheyae 250
  laxum 280
  personatum 296
    var. cassiae 287
  pestis 265
  roseleri 264
  solanicola 251
  versicolor 295
  vitis 314
Clasterosporium 451
  amygdalearum 256
  carpophylum 255-256
  diffusum 264
Clathrus 64, 70
  crispus 64, 74
Claudopus
  pandanicola 131
Clavaria 46, 49, 53, 67, 70, 81

[Clavaria] bisterigmatica 46, 73
  brasiliensis 67, 74
  carbonaria 53
  fastigiata 67
  furcellata 49
  nivea 67, 78
  surculus 49
Clavulina 70
  amethystea 67, 73
  cristata 67, 74
Calvulinopsis 70
  corniculata 67, 74
Clithris
  pandani 131
Clypeosphaeria
  stevensii 127
Coccoidella 10, 70
  euglypta 10, 75
Coccomyces 42, 70
  leptosporus 42, 77
Cochliobolus
  miyabeanus 407-408
Colletotrichum
  pandani 139
Collybia 58, 70
  longipes 58
  neotropica 58, 78
  plectophylla 58, 78
  polygramma 58, 78
  syringea 58, 80
Coltricia 48, 70
  fragilissima 48, 75
  perennis 67, 78
  spathulata 48, 79
Comatricha 5, 70
  longa 5, 77
  nigra 5, 78
  typhoides 5, 80
Complexipes 378
Coniothyrium
  pandanicola 139
  perottianum 139
Conocybe 54, 70
  siennophylla 55, 79
  umbellula 67, 80
Cookeina 43, 70, 81
  speciosa 43, 79-80
  sulcipes 80, 327
  tricholoma 43, 80
Coprinus 55, 70
  lagopus 55, 76
  mirabilis 55, 77
  plicatilis 55, 78
Cordella 196
  coniosporioides 196
  fasciculata 196
  spinulosa 195-196
  tomentosa 195
Cordierites 41, 70, 85
  guianensis 41, 76
Cordyceps 17, 70, 386
  larvata 17, 76
  strangulans 67, 80
  strangulatus 67
Coriolopsis 50, 70
  asper 50, 73
  occidentalis 50, 78
  rigida 326
  sprucei 67, 80
Coriolus
  velutinus 70, 80
Corticium 67
  caulinum 67, 74
  cornucopioides 68
Cortinarius 99
Coryneum 280
  beyerinckii 256
  carpophilum 255
Cotylidia 49, 70
  aurantiaca 49
  spectabilis 1, **49**, 79
Craterellus 68
  cornucopioides 74
Craterium 4, 70
  leucocephalum 4, 77
  paraguayense 4, 78
Creosphaeria
  sassafras 471-474, 476
Crepidotis
  parietalis 128
Cribraria 3, 70
  costata 3, 74
  microcarpa 3, 77
Crinipellis 58, 70
  eggersii 58, 75
  septotricha 58, 79
  urbica 58, 80
Crocicreas 81
Cryptophiale
  caudata 129
  novae-caledoniae 129
Cudonia
  circinans 375
  confusa 375
Cyathus 65, 70
  helenae 65, 76
  limbatus 65, 77
  plicatus 65, 78
Cyclomyces 48, 70
  fuscus 48, 75
  iodinus 48, 76
Cylindrocarpon 7, 70, 81, 84
  septosporum 7, 79
Cylindrospora
  ajugae 247
Cylindrosporium

[Cylindrosporium] brassicae 253
  capsellae 253
  grevilleanum 274
  latifolii 294
  nesliae 253
  pimpinellae
    var. pastinacae 294
  septatum 294
Cymatoderma 50, 70
  caperatus 326
  dentriticum 50, 75, 326
Cytosphaeria 7, 70
Cyphella
  pandani 131
Cystidiodontia
  artocreas 324, 327
Cytosphaeria 7
  mangiferae 7, 77
Cytospora
  pandani 139

Dacryopinax 44, 70
  formosus 44, 75
  indacocheae 44, 76
  martinii 44, 77
  spathularia 44, 79
Dactylaria
  iriomoteana 137
Daedalea 50, 70
  aethalodes 50, 73
Daldinia 36, 70
  concentrica 36, 74
    var. escholzii 36, 75
Dasyscyphus 480
Datronia 50, 70
  caperata 50, 74
Dendrosphaera 382
Dennisiomyces 56, 70
  griseus 56, 76
Diaporthe 18, 70
  arctii 18, 73
Diatrype 18, 70, 477
  erinaea 68, 73
  phaselina 18, 78
  radicalis 68, 79
  stellulata 68, 80
  urticaria 18, 80
Diatrypella 18, 70, 477
  quercina 18, 79
Dictydium 4, 70
  cancellatum 4, 74
Dictyonema 83
Dictyophora 65, 70
  indusiata 65, 76
Dictyoploca 58, 61
Didymella 350
  pandani 131
  pandanicola 131, 134
Didymium 4, 70
  iridis 4, 76
Dimerosporium
  pandani 131
Dingleya 390
  geometrica 379
  phymatodea 379
  tessellata 379
Diplococcium
  pandani 137
Diplodia
  fructus-pandani 139
    f. foliorum 139
  pandani 139
Diplodina
  pandani 139
Diploschistes 212, 225
  actinostomus
    var. farinosus 212
  diacapsis 212
  steppicus 212
Disciseda 65, 70
  cervina 65, 74
Distocercospora 240, 245
  africana 235, 247
Ditiola 44, 70
  radicata 45, 79
Dothidasteromella
  pandani 131
Dothidea 70
  acrocomiae 68, 73
  phylloplacus 68, 78
Dothiorella
  maculosa 139
Dysrynchis 13, 70
  oligotricha 13, 78

Earliella 50, 70
  scabrosa 50, 79, 326
Echidnodes
  pandani 130-132
  sandwicensis 131
Echinochaete 50, 70
  brachypora 50, 73
Elaphomyces 371-373, 375, 384, 386, 388-390
  anthracinus 373-374
  asperulus 374
  cervinus 374
  granulatus 374
  guangdongensis 375
  leveillei 375
  morretti 375
  muricatus 375, 388
  mutabilis 375
  miyabeanus 375
  nopporensis 375
  persoonii 375

[Elaphomyces] reticulatus 375
  subviscidus 375
  trappei 375
  variegatus 375
  verrucosus 375
  viridiseptum 375, 390
Ellisembia
  palauensis 129
  paravaginata 137
  vaginata 129
Ellisiodothis
  microdisca 127
  pandani 131
Encoelia 41, 70
  cubensis 41, 74
Endocreas 70
  lasiacidis 18, 76, 84
Enslinia 70
  leprieuri 68, 77
Entoloma 56, 70
  lycopersicum 56, 77
  tucucgense 56, 80
Epiococcum
  nirgum 137
  pandani 137
Erinella
  alboflaveola 131
Eriocercospora 240, 245
  balladynae 234, 249
Eutypa
  armeniacae
Exosporium 280
  celastri 256
  palmivorum 293
  preissii 293

Favolaschia 47, 70, 85
  auriscalpium 47, 73
  fendleri 47, 75
Favolus 50, 70, 324
  brasiliensis 50, 74
Fennelomyces 145
  naumovii 145, **148**
Fibricium
  rude 324
Fibrodontia
  gossypina 324
Fibulomyces
  mutabilis 324, 328
Filoboletus 58, 70
  gracilis 58, 76
Filosporella
  aquatica 137
Fischerula 389
  subcaulis 377
Fistulinella 56, 70
  venezuelae 56, 80
Fluviostroma 35, 70
  wrightii 35, 80
Fomes 50, 70
  fasciatus 51, 75, 326
  marmoratus 51
  pandani 135-136
Fuligo 4, 70
  septica 4, 79
Fugilomyces 209
Fulvia
  berkheyae 250
Fusariella
  cladosporioides 284
Fusarium 7, 70, 84
  betae 250
  pandani 137
  setosum 7, 79, 84
Fusidium
  ajugae 247
Fusisporium
  betae 250
  pandani 137

Gaillardiella 33, 70
  pezizoides 33, 78
Galerina 55, 70, 113
  pectinata 1, **55**, 78
  subpectinata 55
Gallacea 345
Ganoderma 47, 70, 325
  australe 47, 73
  fornicatum 47, 75
  lipsiense 47, 77
  lucidum 47, 77, 325, 327
  multiplicatum 47, 77
  oerstadii 47, 78
  opacum 47, 78
  resinaceum 68, 79
  testaceum 47, 80
  tornatum 48, 80
Gastropila 162
  fragilis 160, 162
Gauemannomyces 85
Gautieria 329
Geastrum 64, 70
  lageniforme 64, 76
  mirabile 64, 77
  saccatum 64, 79
  scleroderma 68, 79
  triplex 327
  velutinum 65, 80
Gelopellis 338
  thaxteri 337
Genabea
  cerebriformis 376
Genea
  anthracnina 376, 389
  gardneri 376
  harknessii 376

[Genea] klotzschii 376
  verrucosa 376
Geopora
  arenicola 378
  cervina 378
  clausa 378
  cooperi 378
    f. gilkeyae 378
  foliacea 378
  nicaensis 378
  sumneriana 378
Gerronema 70
  cyathiforme 64, 75
  tenue 64, 80
Gibberella 18, 70
  fujikuroi 18, 75
Gibellula 7, 70
  pulchra 7, 79
Gliocephalotrichum
  bulbilium 143
Gliocladium 7, 70
  polyporicola 7, 78
Gliomastix
  macroelata 137
Gloeocantharellus 48, 70
  corneri 48, 74
Gloeocystidiellum
  convolvens 324
Gloeophyllum 70
  striatum 51, 80
Gloeosporium
  pandani 139
Glomerella
  pandani 131
Glonium 10, 70
  abbreviatum 10, 73
Gomphus 48, 70
  viridis 48, 80
Grammothele 326
  fuligo 326-327
  lineata 326
  subargentea 326
Graphiola
  phoenicis 68, 78
Graphium
  clavisporium 314
  laxum 275
Groveolopsis
  pandani 139, 141
Guedea
  novae-zelandiae 129
Guignardia
  freycinetiae 127
Gymnopilus 99, 113
  primulinus 113
Gyromitra
  esculenta 377
  infula 377
  sichuanensis 377

Haddowia 48, 70
  longipes 48, 77
Hallingea 329, **339**-341, 343-344
  carneoroseus 340-341
  purpureus 339-**341**, 343
  violaceus 340-341, **343**
Hapalopilus 46, 71
  phlebiaeformis 46, 78
  rutilans 46, 79
Haplaria
  pandani 137
Haplosporella
  pandanicola 136
Harknessia
  pandani 140
Harpographium 7, 71
Helminthosporium 408
  balladynae 249
  carpophilum 255
  cerasorum 256
  manihotis 277
  rhabdiferum 256
  vitis 314
Helotium 82
Helvella
  corium 377
  crispa 377
Hemicorynespora
  naviculiformis 137
Hemitrichia 6, 71
  calyculata 6, 74
  serpula 6, 79
Hendersonia
  heliconia 68, 76
Heraldoa
  pandani 131
Herpotrichia 11, 71
  milletiae 11, 77
Heterochaete 45, 71
  andina 45, 73
Heterochaetella 45, 71
  cystidiophora 45, 75
Heterosporium
  magnoliae 206, 208
Hexagona 82
  aculeata 68, 73
    f. glabrata 68, 76
  papyracea 68, 78, 326
  polygramma 51
Hexagonia 51, 71
  hydnoides 51, 76
  tenuis 51, 80
Hiatula 71
  lignifraga 71, 77
Hirneola 71
  lancicula 68, 76

Hohenbuehelia 64, 71
  paraguayensis 64, 78
Huguenínia
  freycinetiae 127
Humphreya 325
Hyalopleiochaeta 457-458, 461
  delicata 458-460
Hydnobolitis
  cerebriformis 377
Hydnocystis 379
Hydnodon 54, 71
  thelephorus 54, 80
Hydnopolyporus 51, 71
  fimbriatus 51, 75
Hydnotrya
  cerebriformis 377
  cubispora 377
  michaelis 377
  tulasnei 377
Hydropus 58, 71, 85
  bisporus 58, 73
  nigritus 58, 78
  terrae-firmae 58, 80
Hygroaster 56, 71
  nodulisporus 56, 78
Hygrocybe 56, 71
  cheilocystidiata 56, 74
  conica 68, 74
  firma 56, 75
  guianensis 56, 76
  hypohaemacta 56, 76
  lilacinella 56, 77
  martinicensis 56, 77
  miniata 57, 77
  nigrescens
    var. brevispora 57, 74, 78
  nouraguensis 57, 78
  occidentalis 57, 78
  siparia 57, 79
  sp.-1 57
  sp.-2 57
  sp.-3 57
  sp.-4 57
  sp.-5 57
  subflavida 57, 79
Hygrophorus 67, 71
  maroniensis 68, 77
Hymenochaete 48, 71, 325
  berkeleyana 48, 73
  caco 325
  rheicolor 48, 79
Hymenogaster 339
  australe 341
  australis 338
Hymenoscyphus 82
Hymenostilbe 8, 71
Hyphochnicium
  lundellii 324, 327
Hyphodontia 121, 325
  crustosa 119-120
  crustosoglobosa 117, 119-120
  nespori 120-121
  nesporina 117, 120-121
Hyphopodia 85
Hyphothyrium 321
Hypochnus 71
  nigrocinctus 68, 78
Hypocrea 18, 71
  brevipes 18, 74
  flavovirens 18, 75
  fusca 19, 75
  gelatinosa 19, 75
  hemisphaerica 131
  impressa 19, 76
  lutea 19, 77
  nigricans 19, 78
  pallida 19, 82, 78
  patella 19, 78
  phyllogena 68, 78
  rufa 68, 78
  schweinitzii 19, 79
  tingomariensis 19, 80
Hypocrella 17, 71
  gaertneriana 17, 75
Hypocreopsis 71, 84
  xylariicola 68, 80
Hypodiscus 83
Hypogymnia 153
Hypolyssus 71
  montagnei 68, 77
Hypomyces 19, 71, 84
  amaurodermatis 19, 73
  australis 19, 73
  semitranslucens 19, 79
  subiculosus 19, 80
Hyponectria
  pandani 131
Hypoxylon 36-38, 40, 71, 83, 127, 143,
      477
  annulatum 37
  anthracodes 68, 73
  arecarium 68, 73
  asphaltum 68, 73
  coenopus 68, 74
  comaropsis 68, 74
  conostoma 38
  cyclopicum 36, 75
  endoxanthum 68, 75
  exsurgens 68, 75
  fragiforme 472
  freycinetiae 127
  glycirrhiza 37, 76
  hypomiltum 37, 76
  incrustans 68, 76
  irradians 38
  macromphalum 68, 77

[Hypoxylon] macrospermum 68, 77
  microstictum 68, 77
  monticulosum 37, 77
  nucigenum 37, 78
  oceanicum 85
  phoenix 68, 78
  porosum 68, 78
  quisquilarium 37, 79
  rubiginosum 37, 79, 476
  sassafras 472
  sclerophaeum 37, 79
  subannulatum 37, 80
  sulcatum 37, 80
  truncatum 37, 80
  vinosum 37
Hysterangium 329-331, 335, 338-341, 345
  affine 333
  australe 338
  carneoroseum 340
  crassipariete 330-**331**, 333
  epiroticum 334
  eucalyptorum 335-336
  hallingii 330-331, **333**-334, 338
  incognitum 330-331, **334**
  inflatum 330-331, 335-336
  pterosporum 335-336
  purpureum 341, 343
  separabile 335
  spegazzinii 330-331, **336**, 338
  thaxteri 338
  tunicatum 336
  violaceum 343
Hysterium 71
  foliicolum 68, 75
Hysterographium 10, 71
  mori 10, 77

Idriella 472
Immotthia 10, 71
  hypoxylon 10, 76
Inocybe 171, 173-174
  sect. Rimosae 171
  cutifracta 171
  fastigiata 173-174
  virosa 171-172
Inonotus 48, 71
  splitbergeri 48, 80
Iodosphaeria 16, 71
  phyllophila 16, 78
Ionomidotis 85
Irene
  nuxiae 93
Irenina
  aguariae 91
  nuxiae 93
Isariopsis
  clavispora 314
  fuckellii 264
  griseola 275
Isia
  neocaledoniensis 131, 135

Javaria 14, 71
  shimekii 14, 79
Johansonia
  pandani 132
Jongiella 83

Karschia 66, 71
Kavinia
  alboviridis 323, 325, 327
Kirramyces 269, 321
Kodonospora
  tetracolumnaris 137
Kretzschmaria 37, 71
  clavus 37, 74
  lucidula 37, 77

Laboulbeniopsis 66, 71
  termitarius 66, 80
Labyrinthomyces 379, 383, 390
  donkii 379
  varius 379
Lachnea
  vinosobrunnea 378
Lachnocladium 49, 71
  tubulosum 49, 80
Lachnum 41, 71, 479-480, 484
  abnorme 41, 73
  apalum 480, 484
  carici 484-485
  caricis 480
  controversum 480, 484
  palearum 480
  rhytismatis 41, 79
  spartinae 479-480, **482**, 484-485
  tenuissimum 480, 484
Lactarius 63, 71, 175, 186, 411-412, 415, 423-426, 435, 449-450
  subg. Piperites 175, 186
  sect. Lactifluus 423, 450
  sect. Piperites 175, 186
  sect. Polysphaerophorini 424
  subsect. Croceini 175, 186
  subsect. Scrobiculati 184-186
  acerrimus 184-185
  alnicola
    var. alnicola 425, 434-437, 448
    var. pitkinensis 438
    var. pungens 438, 440, 448
  chiapanensis 411-**412**, 414-415, 421
  ciliciodes 185
  citriolens 184-185
  corrugis 422, 425, 438, 440-442, 448
  costaricensis 415
  deceptivus 425, 443-444

[Lactarius] echinosporus 185
  epitheliosus 63, 75
  gigasporus 415
  griseus 425-426, 429
  hygrophoroides 442
  indigo 425, 444, 446
    var. indigo 445
  intermedius 184-186
  maculatus 435, 448
  mediterraneensis 175-**176**, 178, 181-182, 184-186
    f. citrina 175, **182**, 184
  mexicanus 185
  pandani 135
    f. intermedius 135
  petersenii 415
  pseudogerardii 414-415, 421
  resimus 428, 428
    var. regalis 425, 428, 430-431
    var. resimus 425, 427, 429-431, 448
  salmoneus
    var. curtisii 411, 415-417, 421
  scrobiculatus 184-185
  subpalustris 425, 432-435, 448
  veraecrucis 411-412, 416-418, 421
  volemus 419, 421-422, 442
    var. volemus 411-412, 418
  zonarius 184
Lactocollybia 58, 71
  holophaea 58, 76
Lambertella 42, 71
  microscopica 42, 77
Langermannia 162
Lanopila
  bicolor 160
  capensis 160-162
  radloffiana 161
Lanzia 42, 71
  rufocornea 42, 79
Lasiodiplodia 8, 71
  abnormis 140
  theobromae 8, 80
Lasiosphaeria 31, 71
  meznaensis 31, 77
  moseri 31, 77
  raciborskii 31, 79
Lasiosphaeriella 31, 71
  dennisii 32, 75
  noonae-dana 32, 78
Lemalis 71
  mangiferae 68, 77
Lembosia 71
  catervaria 68, 74
  pandani 131-132
Lempholemma 368-369
  fennicum 368
  wrightii 366
Lentaria 49, 71
  mucida 49, 77
  surculus 49, 80
Lentinula 59, 71
  boryana 59, 73
Lentinus 61, 71, 81, 83
  bertieri 61, 73
  concavus 61, 74
  crinitus 62, 74
  fasciatus 62, 75
  ixodes 59
  pergamenus 62
  striatulus 62, 80
  strigosus 62, 80
  swartzii 62, 80
  tephroleucus 52, 80
  tigrinus
    var. holopogonius 62
  velutinus 62, 80
  zonalis 62
Leocarpus 71
  melaleucus 68, 77
Lepiota 71
  clypeolaria 68, 74
Leprieuria 37, 71
  bacillum 38, 73
Leptosphaeria 133
  elaeidis 353-354, 356-357
  pandani 132
  pandanicola 132
Leucoagaricus
  cepaestipes 68
Leucocoprinus 71
  cepaestipes 74
  squamulosus 80
Leucogyrophana
  romellii 323, 325, 327
  subillaqueata 323, 325, 327-328
Leuconectria
  clusiae 143
Leucoprinus 54
  squamulosus 54
Leveillula
  taurica 305
Libertella 472
Lichenostigma 211-212, 219, 223-225
  subg. Lichenogramma 211, **219**, 224
  subg. Lichenostigma 219, 224
  elongata 211-**213**, 214-217, 219-220, 224
  maureri 211-213, 225
  rugosa 211-213
Lichenothelia 219, 223-225
  scopularia 213, 224
Lichina 368
Linocarpon 31, 71, 82
  livistonae 31, 132
  pandani 132, 141
  vermiculosum 31, 80
Linospora

[Linospora] pandani 132
Lobothallia 211-212
  alphoplaca 219
  praeradiosa 219
  radiosa 213-214, 216, 219-220
Lopharia 71
Lophiostroma 11, 71
  caulium 11, 74
Lophodermium
  javanicum
    var. pandani 132
Lycogala 5, 71
  epidendron 5, 75
  exiguum 5, 75
Lycogalopsis 65, 71
  solmsii 65, 79
Lycoperdon 65, 71
  fuligineum 65, 75
Lysurus 71
  cruciatus 68, 74

Macrophoma
  pandani 140
Macrophomella
  pandani 140
Macrosporium
  rhabdiferum 255
Macrovalsaria 66, 71, 85
  megalospora 66, 77
Marasmiellus 59, 71, 85, 143
  defibulatus 59, 75
  incrustatus 59, 76
  nigripes 59, 78
  rubellus 59, 79
  stenophylloides 59, 80
  stenophyllus 59, 80
  troyanus 59, 80
  volvatus 59, 80
Marasmius 58-59, 61, 71, 113
  actinopus 59, 73
  atrorubens 59, 73
  cladophyllus 60, 74
  congregatus 68, 74
  decurrens 68, 75
  dispar 68, 75
  ferrugineus 60, 75
  fulviceps 60, 75
  gamophyllus 68, 75
  griseoroseus 60, 76
  guianensis 60, 76
  haedinus
    var. minor 60, 76-77
  haematocephalus 60, 76
  helvolus 60, 76
  leoninus 60, 77
  longipes 58
  montagneanus 60, 77
  niveus 60, 78
  pallescens 60, 78
  pandanicola 136
  poecius 60, 78
  polycladus 60, 78
  proletarius 60, 78
  pusio 60, 79
  radicellicola 60, 79
  rhabarbarinus 61, 79
  rubricosus 61, 79
  rufescens 61, 79
  rugatus 68, 79
  semiustus
    var. abortivus 136
  splitbergeri 61, 80
  tageticolor 61, 80
  tenuissimus 61
Massarina 11, 71
  corticola 11, 74
Matsushimaea 463, 469
  fasciculata 469
  fertilis 463, 466-467, 468-469
Melanconium
  freycinetiae 126, 130
  merrillii 140
  pandani 133, 140
  pandanicola 140
Melanochaeta 32, 71
  hemispila 32, 76
Melanographium 8, 71, 195-198, 200
  anceps 196
  calami 195, 197-199
  citri 197-198
  cookei 8, 74, 195, 197-198
  fasciculatum 195, 197-198
  indicum 197-198
  maximum 195
  selenoides 197-198
  spinulosum 195-198
  spleniosporum 195-197
  thunbergiae 196-198
  trachycarpi 197
Meliola 13, 126
  juttingii 132
  pandani 132
  pandanicola 133
Melioliphila 14, 71
  volutella 14, 80
Menegazzia 153
Mesniera 348, 350
Metadiplodia
  pandani 140-141
Metasphaeria 133
  chistophersenii 127
  fur 133-134
  profuga 133
Microcyclus
  pandani 133
Microdochium 472

Microglossum 41, 71
  rufum 41, 79
Micropeltis 71
  applanata 68, 73
  marginata 68, 77
Microporellus 51, 71
  dealnatus 51, 75
  obovatus 51, 78
Microsphaerella
  pandani 133
Microthelia 352
  aterrima 213, 225
Midotis 71
  heteromera 68, 76
Minocarpon 85
Mitrula
  lutea 41
Monochaetia 357
Monodictys
  pandani 137
Monographella 357
Monotospora
  fasciculata 195-197
Morchella
  rotunda 377, 384
Muciturbo 390
  reticulatus 376
  truncatus 376
  verrucosus 376
Mucor 145
Mycena 61, 71
  pura 68, 79
  tesselata 61, 80
  trichocephala 61, 80
Mycocentrospora 190
Mycopepon 12, 71, 81
  smithii 12, 79
Mycosphaerella 243-244, 282, 306, 317, 319
  arachidicola 248
  arachidis 248, 319
  berkeleyi 296
  bolleana 251
  capsellae 254
  cerasella 257
  coffeicola 260
  confusa 307
  cruenta 261
  dubia 307
  fragariae 274-275
  freycinetiae 127
  gibsonii 297
  gossypina 272-273
  henningsii 277
  maesae 283
  manihotis 277
  marasasii 283
  musicola 284
  papuaria 248
  personata 314
  piliostigmatis 249
  pruni-persicae 319
  rosicola 306, 319
Mycosyrinx 66, 71
  cisii 66, 74
Mycovellosiella 190, 209, 240, 245, 263, 319
  berkheyae 234, 250
  berkheyae-maritimae 234, 250
  brachycarpa 239, 251
  delicatissima 238, 263
  dichondrae 235, 264
  dombeyae 236, 268
  koepkei 239, 280
  lantaniphila 237, 280
  laxa 238, 280
  perfoliati 234, 295
  solanicola 251
  vaginae 239, 310
Myiocopron 128
  freycinetiae 127-128
  pandani 133
Myocopron pandani 133
Myrmecocystis
  cerebriformis 376
Myrothecium 8, 71

Naematelia 71
  granulosa 68, 76
Napicladium
  brunaudii 256
Naucoria
  pectinata 55
Nectria 19, 29, 71, 81, 84-85, 126
  subg. Dialonectria 85
  subg. Hyphonectria 85
  alata 8, 19, 73
  aureofulva 20, 73
  balansiae 20, 73
  brasilensis 20, 74
  byssicola 20, 74
  calami 20, 74
  chaetopsinae 20, 74
  chaetopsinae-pennicillatae 21, 74
  cinnabarina 21, 74, 84
  cinnamomea 21, 74
  coccinea 68, 74
  consors 133, 138, 143
  coronata 21, 74
  discophora 21, 75
  episphaeria 68, 75
  flammea 21, 75
  flavolanata 8, 21, 75
  flocculenta 21, 75
  foliicola 22, 75
  freycinetiae 127

[Nectria] freycinetii 127
  gossypina 22, 76
  gracilipes 22, 76
  grammicospora 22, 76
  haematococca 23, 76
  ignia 133
  illudens 24, 76
  impariphialis 24, 76
  importata 133
  jatrophae 9, 24, 76
  joca 24, 76
  jungeri 24, 76
  laetidiscoides 25, 76
  lasiacidis 25, 76
  lucida 25, 77
  lucifer 25, 77
  macrostroma 25, 77
  mammiformis 26, 77
  mauritiicola 26, 77
  neogrammicospora 26, 78
  ochroleuca 26, 78, 133
  olivacea 27, 78
  pandani 133
  penicilliferi 8, 27, 78
  pertusa 27, 78
  pityrodes 8, 27, 78
  pseudocinnabarina 27, 78
  pseudotrichia 27, 79
  purtonii 28, 79
  radicicola 28, 79
  rigidiuscula 28, 79
  rubrococca 28, 79
  rugulosa 28, 79
  sanguinea 68, 79
  scitula 28, 79
  septospora 7, 28, 79
  sesquicillii 28, 79
  setofusariae 7, 29, 79, 84
  stilbellae 9, 29, 80
  striispora 29, 80
  subfalcata 29, 80
  subquaternata 29, 80
  suffulta 29, 80
  sylvana 29, 80
  triqua 30, 80
  vermispora 30, 80
  vilior 30, 80
Nectriopsis 30, 71, 84
  byssotecta 30, 74
  epimycota 30, 75
  leucorrhodina 30, 77
  oropensoides 30, 76
Neocudoniella
  radicella 376
Neohypodiscus 38, 71
  irradians 38, 76
Neopeckia
  rhodosticta
    var. magnifica 133
Neotyphula 71
  guianensis 68, 76
Niesslia 32, 71
  erysipheoides 32, 75
Nimbya 407
Nitschkia 33, 71
  acanthostroma 33, 73
  floridana 33, 75
  grevillei 33, 76
  macrospora 34, 77
Nodulisporium 8, 71
  acervatum 8, 73
  gregarium 8, 76
Nothojafnea
  cryptotricha 379
Nothopanus 62, 71
  hygrophanus 62, 76

Odontia
  flexibilis 128
Oedemium
  sparsum 137
Omphalaria
  wrightii 360, 366, 368
Oospora
  macrotricha 138
Ophiobolus 85
Ophionectria 30, 71
  magniverrucosa 30, 77
  trichospora 30, 80
Ophiosphaerella 13, 71
  graminicola 13, 76
Ophiostoma 34, 71
  grande 34, 76
  roraimense 34, 79
Orbilia 42, 71
  auricolor 42, 73
Ostropella 12, 71
  albocincta 12, 73
Otidea
  indivisa 378
Oudemansiella 56, 71
  canarii 56, 74
Ovularia
  brassicae 253
Oxydothis
  pandani 134
  pandanicola 131, 134
Oxyporus 51, 71
  latemarginatus 51, 77

Packykytospora
  alabamae 326
Paecilomyces
  iriomoteanus 138
Panaeolus 55, 71
  campanulatus 55, 74

[Panaeolus] papilionaceus 68, 78
Pandanicola
  calocarpa 130, 134
Panellus 64, 71
  pusillus 64, 79
Pantospora 194, 319
Panus 61, 81
  anthocephalus 135-136
  badius 324
  bicolor 64
  leprieuri 59
  rudis 324
Papularia 196
Paraaoria
  himalayana 209
Paracercospora 240, 245
  egenula 239, 268
  scolopiae 239, 308
Parastenella 206, 208
  magnoliae 206
Parastigmatea
  pandani 134
Parasympodiella 464
Parmelia 151-153
  cunninghamii 151-152
  fraudans 152
  kerguelensis 152
  lindsayana 151-152
  protosulcata 151-152
  saxatilis 152
  sulcata 152
Passalora 233, 240, 246, 274, 310, 318
  avicularis 238, 249
  bolleana 236, 251
  brunaudii 256
  circumscissa 238, 257
  dubia 235, 268
  graminis 235, 273-274
  henningsii 237, 276
  omphacodes 238, **288**-290
  pachycarpi 237, **291**-292
  pastinaca 237, 248, 294
  personata 234, 296
  rosicola 239, 306
  rubro-tincta 238, 307
  verbeniphila 239, 299, **310**
Paulia 359-364, 368-369
  caespitosa 359-**360**, 362-364, 368
  gibbosa 360, 364
  glomerata 360, 362-364, 368-369
  japonica 360, 362-364, 368
  wrightii 359, **366**, 368
Peccania 359, 368
  wrightii 366
Peltella
  freycinetiae 127-128
Peltostoma 321
  freycinetiae 130
Pemphidium 71
  nitidum 68, 78
Penicillifer 8, 71, 84
  bipapillatus 8, 73
  microsporus 8, 77
Penicillium 8, 71
Peniophora 325
  gabonensis 136
Penzigia 38, 72
  conostoma 38, 74
  indica 38, 76
Perenniporia 51, 72, 327
  glaucopora 327
  medulla-panis 51, 77
Peristomialis 72, 84
  berkeleyi 31, 73
  paraparilis 31, 78
  parilis 31, 78
Pestalosphaeria 84, 353-354, 356-357
  accidenta 354
  austro-americana 354
  concentrica 353-354
  elaeidis 353-355
  hansenii 354
  jinggangensis 354
  leucospermi 354
  varia 354, 357
Pestalotia 8, 72, 357
  guepinii 8, 76
  pandani 140
  peyronelii 141
Pestalotiopsis 353, 356-357
  besseyic 357
Pestalozzia
  pandani 140
  peyronelii 141
Peziza 69, 72
  applanata 68, 73
  badia 377
  hindsii 68, 76
  lohjaensis 377
  whitei 377
Phacidium 72
  phomatoides 69, 78
Phaeangium
  lefebvrei 379, 383
Phaeocollybia 85, 97-99, 113-116
  sect. Microsporae 107, 110, 113
  sect. Versicolores 104, 107, 110, 113
  australiensis 97, **100-101**, 102, 104
  caudata 107, 110, 115
  christinae 98
  festiva 115
  kauffmanii 114
  longipes 115
  primulina 113
  primulinus 98
  querqueti 107

[Phaeocollybia] rancida 106
  ratticauda 97-98, 100, 104, 106-108, 110-115
    var. myrtaeceophila 97, 100, 106-107, 108, 110, 115
  singularis 104
  tasmanica 97, 100, 108, **110-114**
Phaeoisariopsis 209, 240, 244, 287, 318-319
  griseola 238, 275
  melanochaeta 237, 284
  sphaeroidea 287
  vitis 314
Phaeoramularia 208-209, 240, 245, 287, 320
  dissiliensis 240, 264
  fusimaculans 234, 272
  kellermaniana 278
  occidentalis 235, 287
Phaeoschizophyllum 54, 72
  leprieuri 54, 77
Phaeoseptoria 269
  eucalypti 321
Phaeosphaeria 13, 72
  halima 480
  minima 13, 77
  spartinicola 480
Phaeosporella
  rosicola 306
Phaeosporobolus 224
  usneae 225
Phallobata 345
Phallus 65
  indusiatus 65
  radicatus 65
Phanerochaete 72
  crassa 69, 74
  sordida 325
Phellinus 48, 72
  gilvus 48, 75, 325
    var. licnoides 49, 77
  noxius 325
  pachyphloeus 82
Phialophota 85
Phillipsia 43, 72, 83
  tetraspora 43, 80
Phlebia 325
Phloeospora 269
  laserpitii 294
  septata 294
Phloeosporella 269
Phoma
  fructus-pandani 141
  martellii 141
  pandani 140-141
Phomatospora
  cylindrotheca 134
  pandani 134
Phomopsis
  eumorpha 130
  pandani 141
Phylacia 38, 72, 83
  poculiformis 38, 78
Phyllachora 34, 72
  freycinetiae 128
  rhopalina 34, 79
Phyllomyces 85
Phyllosticta
  pandanicola 141
  umbellatarum 294
Physalacria 61, 72
Physalospora
  pandani 134
Physarella 4, 72
  oblonga 4
Physarum 4, 72, 170
  bivalve 4, 73
  bogoriense 4, 73
  compressum 4, 74, 142
  fasciculata 142
  globuliferum 4, 76
  javanicum 4, 76
  nucleatum 4, 78
  nutans 4
  penetrale 5, 78
  reniforme 142
  stellatum 5, 80
  viride 5, 80
Picoa
  carthusiana 376
Pionnotes
  betae 250
Pirostoma
  farnetianum 141
Placoasterella
  pandanicola 134
Placodium
  alphoplacum 219
Placsoterella
  pandanicola 134
Platismatia 153
Pleiochaeta 457-458, 460-462
  amazonensis 461
  ghindensis 461
  setosa 460-461
  stellaris 461
Plenodomus
  inaequalis 141
Pleurophragmium
  hippotrichoides 137-138
Pleurotus 62, 72, 81
  djamor 62, 75
  ostreatus 62, 78
  tahitensis 136
Plicaria
  alveolata 377

Pluteus 62, 67, 72
  aethalus 62, 73
  alborubellus 73
  albostipitatus 63, 73
  fluminensis 63, 75
  sapiicola 63, 79
  sergii 63, 79
Poculum 42, 72
  crocatum 42, 74
Podoscypha 50, 72
  brasiliensis 50, 74
  macrorhiza 50, 77
  nitidula 50, 78
Podostroma 31, 72
  eperuae 31, 75
Poloniodiscus 85
Polyactis
  olivacea 137
Polycoccum 350
Polydiscidium 41, 72
  martynii 41, 77
Polyporus 47-48, 50-53, 67, 72
  actinobolus 52
  aculeatus 51
  agariceus 69, 73
  auriformis 52
  brunneolus 52
  campyloporus 48
  cruentus 50
  dictyopus 51, 75
  diederichsenii 52
  extensus 69, 75
  fibrosoradiatus 69, 75
  floridanus 53
  gibberulosus 53
  gilvus
    var. scabrorugosus 69, 75, 79
  grammocephalus
    var. cayennensis 69, 74, 76
  guianensis 51, 76
  heteromorphus 47
  hostmanii 50
  infernalis 327
  leiodermus 52
  leprieuri 51, 77
  licnoides 49
  micromegas 52
  monochrous 52
  multiformis 48
  mutabilis 51
  nitidus
    var. croceus 69, 74, 78
  omalopilus 48
  pandani 126, 135-136
  phaeoporus 50
  rhizomorphus 51, 79
  schomburgkii 47
  tenuiculus 51, 80
  tricholoma 51, 80
  tristiusculus 69, 80
Polyschema 451, 455-456
  chambalensis 455-456
  clavulata 455
  congolensis 456
  cubensis 455
  indica 451, 456
  larviformis 455-456
  lignicola 455-456
  olivacea 456
  queenslandica 455
  sagari 455
  terricola 455
  variabilis 456
  venusta 451-**452**, 453-456
  yakuensis 455
Poronia 38, 72
  heliscus 69, 76
  oedipus 38, 78
Porostereum 54, 71-72
  papyrinum 54, 78
Proliferodiscus 41, 72
  inspersus 41, 76
Protubera 345
Psathyrella 55, 72
  annulosa 55, 73
Pseudaleuria
  quinaultiana 379, 386
Pseudevernia
  furfuracea 212
Pseudocamptoum
  citri 195-197
Pseudocercospora 187-189, 192, 194, 208, 233, 240, 244, 258-259, 263, 269, 272, 278, 282, 288, 290, 294, 296, 304, 317, 319-320
  argyrolobii 234, 249
  avicularis 249
  bauhiniae 234, 249
  byliana 234, 252
  clerodendri 235, 258
  clutiicola 235, 258
  columnaris 275
  correae 193-194
  correicola 194
  cruenta 238-239, 261
  curtisiae 235, **261**-262
  diospyri-lycioides 235, 264
  dissotidis 235, **265**-266
  doidgei 233, 239, **265**-266
  dovyalidis 236, 268
  eucalypti 269
  eucalyptorum 236, 269-270, 318
  fici 272
  fici-caricae 272
  fici-sycamorusii 233, 236, **270**-271
  formosana 237, 272

[Pseudocercospora] halleriae 236, 276
  handellii 239, 276
  jussiaeae 237, 278
  kenemensis 192
  kiagweensis 267
  kiggelariae 237, 279
  lantana-aculeatae 272
  liebenbergii 281
  maclurae 187, 189-**190**, 192-193
  marasasii 239, 283
  melaena 236, 283
  musae 237, 284
  myrticola 237, 284
  oliniae 237, 286, **288**
  omphacodes 291
  pallidissima 239, 293
  paraguayensis 233, 270
  pareirae 235, 292-**293**
  persicariae 238, 295-296
  pini-densiflorae 238, 297
  polygonicola 296
  pouzolziae 238, 298-299
  pseudarthriae 238, 301-302
  psychotriicola 238, 302
  punctata 236, 303
  punctiformis 235, 299, 303-304
  purpurea 238, 304
  rhoicissi 239, 305
  riachueli 235, 305
  rogersoniana 233, 289, **291**
  rubi 239, 307
  scitula 234, 308
  stizolobii 239, 309
  timorensis 237, 309
  transvaalensis 234, 309
  trematicola 267
  trematis-cannabini 267
  trematis-orientalis 267
  vitis 187, 192, 240, 314
  withaniae 240, 314
  zizyphi 240, 315-317
  ziziphicola 317
Pseudocercosporella 240, 243, 248, 319
  capsellae 234, 238, 253
  dovyalidis 268
  herpotrichoides 277
  laserpitii 295
  pastinacae 234, 294
Pseudocercosporidium 319
Pseudohydnum 45, 72
  gelatinosum 45, 75
    var. bisporum 45, 73
Pseudonectria 143
  tornata 133
Psilocybe 63, 72
  coprophila 63, 74
  cubensis 63, 74
Pterula 53, 72
  dilatata 53, 75
  fructicola 136
  taxiformis 53, 80
Puccinia
  freycinetiae 129
  leucadis 281
Pucciniopsis
  caffra 252
Pulveroboletus 55, 72
  brachyspermus 55, 73
Pulvinula 42, 72
  anthracobia 42, 73
  etiolata 42, 75
  tetraspora 379
Punctelia 153
Pycnoporus 52, 72
  sanguineus 52, 79
Pycnothyrium
  pandani 141
Pyrenocyclus
  ambiguus 128
Pyrenula
  flagellata 134
Pyrofomes 52, 72
  aurantiacus 52, 73
Pyronema 72
  omphalodes 69, 78
Pyrrhoglossum 55, 72, 99
  stipitatum 55, 80

Ragnhildiana
  agerati 295
  roseleri 264
Ramaria 49, 53, 72
  subg. Echinoramaria 83
  acutissima 53, 73
  albocinerea 53, 73
  cyanocephala 53, 75
  formosa 69, 75
  gigantea 53, 75
  guianensis 53, 76
  insigne 53, 76
  pancarribaea 53, 78
  zippelii 53, 81
Ramularia 240, 243, 248, 275, 305, 317-318
  agerati 295
  ajugae 234, 247
    var. ajugae-pyramidalis 247
  areolata 273
  batatae 309
  camelinae 254
  cassiicola 287
  chorisiae 253
  decipiens 307
  dubia 268
  fragariae 274
  gossypii 273

[Ramularia] grevilleana 236, 274
  grewiae-occidentalis 236, 275
  heraclei 234, 277
    var. apii-graveolentis 277
  pastinacae 294
  primulae 238, 300
  rapae 253
  richardii 239, 305
  rumicis 239, 307
  tozziae 247
  tulasnei 274
    var. fragariae-vescae 274
  zinniae 240, 315
Ramulariopsis 240, 243, 319
  gossypii 236, 273
Ramulispora 240, 243
  herpotrichoides 239, 277
    var. herpotrichoides 277
Rectipilus 49, 72
  confertus 49, 74
Reddellomyces 390
  donkii 379
  magnisporus 379
  parvulosporus 379
  westraliensis 379
Resupinatus 72
  striatulus 69, 80
Rhabdospora
  pandani 139, 141
Rhagadostroma 34, 72
  coccifera 34, 74
Rhizomorpha 66, 72
  corynephora 66, 74
Rhizopogon 329, 345
Rhodoarrhenia 66, 72
  pensilis 66, 78
Rhodocybe 56, 72
  testacea 56, 80
Rhytidhysterion 13, 72
  rufulum 13, 79
Rhytisma
  astrocaryi 69, 73
  gyrosum 69, 76
  myricae 69, 77
Rigidoporus 52, 72
  microporus 52, 77, 327
  ulmarius 52, 80
  zonalis 52, 81
Rosellinia 72
  mammiformis 69, 77
  pandanicola 134-135
Russula 63, 72
  hygrophytica 63, 76
  moyersoni
    var. brunnea 63, 74, 77
  violaceotunicata 63, 80
Rutstroemia 42, 72
Sacidium 72
  mauritiae 69, 77
Sarawakus 31, 72
  lycogaloides 31, 77
Sarcopodium 8, 72
Sarcoscypha
  harzsluszkia 378
Sarcosoma
  globosum 380
Schizochora
  pandani 134
Schizophyllum 54, 72, 81
  commune 54, 74
  umbrinum 54, 80
Scleroderma 66, 72
  pandanaceum 136
  sinnamariense 66, 79
  verrucosum 136
Sclerotium
  hypocreaemorphum 138
Scolicotrichum
  graminis 273
Scutellinia 42, 72, 85
  blumenaviensis 43, 73
Scytinostroma 328
  duriusculum 323, 326-327
  hemidichophyticum 323, 326, 328
  odoratum 323, 326-327
  rhizomorpharum 323, 326-328
Septobasidium 45, 72
  leprieuri 45, 77
  rhabarbarinum 45, 79
Septocylindrium
  areolatum 273
  dissiliens 264
  gossypii 273
  virens 265
Septogloeum
  arachidis 296
  laserpitii 294
  manihotis 277
  punctatum 303
  septatum 294
Septonema
  vitis 314
Septoria 260
  laserpitii 294
Septoriopsis
  pandani 139
Septosporium
  bolleanum 251
  cerasorum 256
  fuckelii 264
Sepultaria
  arenicola 378
  foliacea 378
Seridium 357
Sesquicillium 8, 72, 85

[Sesquicillium] impariphiale 8, 76
Seynesia 16, 72, 128
  atkinsonii 127-128
  erumpens 16, 75
  freycinetiae 128
Sinosphaeria 34, 72
  lasiacidis 34, 76, 84
Sirosporium 209, 240, 245
  diffusum 234, 264
Solenopeziza
  mellina 134
Solheimia
  kamatii 138
Spathularia
  flavida 376
Spegazzinia 8, 72
  deightonii 8, 75
Sphaerella
  gossypina 272
Sphaeria 69, 72
  clivulosa 69, 74
  fragariae 274
  fur 126, 133-134
  fusariispora 69, 75
  nitidula 69, 78
  oedema 69, 78
  pandani 130, 135
  pandanicola 135
  profuga 126, 133
  pseudobombarda 69, 78
  rhaphidosperma 69, 79
  schizostoma 69, 79
  sulcigena 69, 80
  trichodes 69, 80
  uberina 69, 80
Sphaeriodothis
  merrilli 126, 128
Sphaeropsis 72
  pandani 132, 140-141
  paradisiaca 69, 78
Sphaerosporella
  brunnea 379, 384
Sphaerulina
  oryzina 291
Sporidesmium 143
  amygdalearum 256
  freycinetiae 129
  maclurae 187-188, 190
Sporoschisma
  mirabile 127
Sporostachys 196
  anceps 196
  maxima 195-197
Sporotrichum
  oligocarpum 137-138
Stachybotrys 126
  breviusculus 129
  freycinetiae 129
  nephrodes 129
Staheliomyces 65, 72
  cinctus 65, 74
Stegasphaeria 348
Stemonitis 5, 72
  fusca 5, 75
  pallida 5, 78
  splendens 6, 79
Stenella 201-202, 204, 208, 240, 245, 302
  canavaliae 204, 208-209
  maesae 237, 283
  osyrina 201-**202**, 203
  psychotriae 233, 302
  shoreae 204
Stenellopsis 201, 206, 209
  fagraeae 206
  nepalensis 201, **204**-206
  shorae 206
  shoreae 206
  xeromphigena 206, 209
Stereopsis 50, 72
  hiscens 50, 76
  radicans 50, 79
Stereum 54, 72
  damaecornis 49
  fasciatus 325
  lobatum 54, 77
Stictis 72
  microsticta 69, 77
  subiculata 128
  variolosa 69, 80
Stigmatea
  cinereomaculans 135
  pandani 135
Stigmina 193, 233, 240, 244, 259, 280, 287, 300, 321
  briosiana 256
  caffra 236, 252, 279-280
  carpophila 238, 255
  celastri 235, 256
  cocculi 233, 235, **258**, 262
  curvispora 239, 263
  knoxdaviesii 233, 239, 271, **279**-280
  liebenbergii 282
  oblecta 234, **285**-286
  palmivora 238, 293
  proteae 300
  protearum
    var. leucadendri 301
    var. protearum 301
  pulviniformis 239, 303
  rauvolfia 282
  rauvolfiae 281
  rhois 239, 305
  robbenensis 236, 306
  verruculosa 311
Stigonema
  minutissimum

[Stigonema minutissima] f. lichenicolum 219
Stilbella 9, 72, 85
  aciculosa 9, 73
  aleuriata 9, 73
  clavulata 9, 74
  fusca 9, 75
Stilbophoma
  inaequalis 141
Stipitochaete 49, 72, 84
  damaecornis 49, 75
  reniformis 49, 79
Striatosphaeria 32, 72
  codinophora 32, 74
Symphyrosita
  areolata 273
Synalissa
  symphorea 361
  wrightii 366

Tapesia
  yallundae 277
Terfezia 380, 383
  arenaria 380
  leonis 380
  claveryi 380
  gigantea 380, 390
  hispanica 380
  leptoderma 380, 386
  olbiensis 380
  transcaucasica 389
Termitaria 9, 72
  coronata 9, 74
Thamnomyces 38, 72
  chordalis 38, 74
  dendroideus 38, 75
  rostratus 69, 79
Thaxteria 32, 72
  leptosporioides 32, 77
Thaxterogaster 329
Theissenia 39, 72
  pyrenocratia 39, 79
Thelephora 50, 72
  aurantiaca 49
  liliputiana 69, 77
  nigella 69, 78
  padinaeformis 54
  speciosa 49
  spectabilis 49
Thielavia
  neocaledoniensis 131, 135
Tirmania 378, 383
  nivea 377
  pinoyi 377
Torula
  dissiliens 264
  fasciculata 469
  macrotricha 138
Trametes 51-52, 72, 327
  beyrichii 69, 73
  cubensis 52, 74
  elegans 52, 75
  menziesii 52, 77
  modesta 52, 77, 327
  sagraeana 52, 79
  versicolor 52, 80
  villosa 53, 80, 327
Trematosphaeria 14, 72
  confusa 14, 74
  perrumpens 14, 78
Tremella 45, 72
  aurantia 45, 73
  fibulifera 45, 75
  fimbriata 45, 75
  lutescens 45, 77
  tubercularia 45, 80
Tretospora 201, 208-209
  himalayana 201, **206**-208
  indica 208
  negrii 208
  shoreae 208
Triblidium 66, 72
  cruentatum 66, 74
  pandani 135
Trichaptum 53, 72, 327
  byssogeneum 53, 74, 327
  perrottetii 53, 78
  sector 53, 79
Tricharina 390
Trichia 6, 72
  favoginea 6, 75
Tricholoma 64, 72
  crassum 64, 74
Tricholomopsis 64, 72
  atrogrïsea 64, 73
Trichonectria 85
Trichophaea
  hazslinszkia 378
Trichosphaerella 32, 72
  decipiens 32, 75
Trichosporum
  selenioides 196-197
Triscelophorus
  ponapenis 138
Trogia 61, 72
  buccinalis 61, 74
  cantharelloides 61, 74
Truncocolumella 340
Tryblidium
  pandani 135
Tuber 227-232, 373, 386
  aestivum 227-231, 372, 380, 388
  albidum 380, 385, 388-389
  asa 380
  borchii 227-231, 380, 387
  brumale 381, 388

[Tuber] californicum 381
  dryophilum 381
  excavatum 381
  ferrugineum 382
  foetidum 381
  gibbosum 381
  griseum 381
  hiromichii 381
  levissimum 381
  macrosporum 381, 385
  maculatum 381, 385
  magnatum 227-229, 231-232, 381, 387
  melanosporum 227-231, 381, 387-388
  mesentericum 382
  murinum 382
  nitidum 382
  panniferum 382
  puberulum 382
  rufum 382
  sinense 382
  texense 382, 385
Tubercularia 9, 72
  lateritia 9, 77
Tubeufia 14-15, 72
  aurantiella 14, 73
  clintonii 14, 74
  cylindrothecia 15, 75
  helicoma 15, 76
  paludosa 15, 78
  pezizula 15, 78
  roraimensis 15, 79
  scopula 15, 79
Tubifera 5, 72
  bombarda 5, 73
  ferruginosa 5, 75
  microsperma 5, 77

Uncinula 209
Ungulina
  spermolepidis
    var. pandani 136
Uredo 66, 72
  freycinetiae 129
  scleriae 66, 79
Usnea 212
Ustulina 39, 72
  deusta 39, 75
Uvaricospora 9, 72
  lignicola 9, 77

Valetoniella 32, 72
  crucipila 32, 74
Valsaria 34, 72
  rubricosa 34, 79
Vararia 326
Venturia
  borgiana 135
Vermicularia
  pandani 141
Vestergrenia
  pandani 135
Virgasporium
  maculatum 304
Volutella 143
  ciliata 138
  mellea 138
  minima 138
Volutellaris
  fuliginea 138
Volvaria
  pruinosa 136
Volvariella 63, 72
  minutella 63, 77
  perciliata 63, 78
Vuilleminia 123
  comedenti 121, 323, 325, 327-328
  subglobispora 121-123

Wilcoxina 378, 390
  mikolae 378
    var. mikolae 378, 389
    var. tetraspora 379
  rehmii 379

Xenolophium 12, 73, 82
  applanatum 12, 73
  guianense 12, 76
  pachythele 12, 78
  samuelsii 12, 79
Xerocomus 340
Xeromphalina 61, 73
  tenuipes 61, 80
Xylaria 39, 68, 73, 81, 477
  adscendens 39, 73
  aenea 39, 73
  allantoides 39, 73
  anisopleura 39, 73
  apeibae 69, 73
  aristata 39, 73
  atrosphaerica 39, 73
  axifera 39, 73
  berkeleyi 39, 73
  coccophora 39, 74
  collabens 69, 74
  columnifera 69, 74
  comosa 39, 74
  compressa 39, 74
  corniformis 39, 74
  cubensis 39, 74
  curta 39, 74
  dealbata 327
  enterogena 39, 75
  feejensis 40, 75
  globosa 69, 76
  gomphus 69, 76
  gracillima 40, 76

[Xylaria] grammica 40, 76
  guianensis 40, 76
  hyperythra 69, 76
  hypoxylon 40, 76
  ianthino-velutina 40, 76
  kegeliana 40, 76
  microceras 40, 77
  multiplex 40, 77
  myosurus 69, 77
  obovata 40, 78
  phyllocharis 40, 78
  polymorpha 40, 78
  pumila 40, 79
  rhizocola 40, 79
  rhizomorpha 69, 79
  rhytidophloeus 40
  ruginosa 69, 79
  scopicola 40, 79
  scopiformis 40
  scruposa 40, 79
  telfairi 40, 80
Xylobotryum 10, 73
  andinum 10, 73
Xylocoremium 9, 73
Xylophallus 65, 73
  xylogenus 65, 80
Xylosphaeria 39

Zebrospora
  bicolor 130

Reviewers, Volume Fifty-Seven

The Editors express their appreciation to the following individuals who have, prior to acceptance for publication, reviewed one or more of the papers appearing in this volume:

A. W. Archer
R. E. Beever
A. Berniccha
I. H. Chapela
J. Cifuentes Blanco
J. L. Crane
J. David
E. Descals
I. J. Gamundi
R. D. Goos
B. Granetti
J. H. Haines
R. T. Hanlin
G. L. Hennebert
E. Horak
B. Kendrick
P. M. Kirk
R. P. Korf
E. Langer
G. Moreno
M. Moser
N. E. Nannega-Bremekamp
T. H. Nash
A. Ortega
M. E. Palm
D. N. Pegler
L. E. Petrini
D. H. Pfister
R. Pöder
P. Reddell
J. D. Rogers
L. Ryvarden
A. Sivanesan
J. Trappe
N. Waipara
M. J. Wingfield
J. E. Wright

Publication Date Volume Fifty-Six

MYCOTAXON for October-December 1995, 56: 1-512
was issued on November 24, 1995.

EDITORS OF MYCOTAXON

JEAN BOISE CARGILL, *Editor-in-Chief*
Harvard University Herbaria, 22 Divinity Ave.
Cambridge, MA 02138, U.S.A.

ASSOCIATE EDITORS

Robert Dirig
Index Editor
Bailey Hortorium, Mann Library
Cornell Univ., Ithaca, NY
U. S. A.

David S. Hibbett
Book Review Editor
Harvard University Herbaria
Cambridge, MA
U. S. A.

G. L. Hennebert
French Language Editor
UCL, Place Croix du Sud 3
B-1348 Louvain-la-Neuve
Belgium

MYCOTAXON is a quarterly journal devoted to all phases of mycological taxonomy and nomenclature. All articles are reviewed by specialists prior to acceptance. Publication is open to all persons. Papers may be in French or in English. Summaries in those or any additional languages desired by the authors are given for longer articles. Printing is on high quality, acid-free book paper.

Authors prepare their own *camera-ready* copy after having received critical comments from pre-submission reviewers. *Instructions to Authors* appeared in MYCOTAXON 50: 493-497. 1994. A copy of these instructions will be sent upon request to the Editor-in-Chief.

SUBSCRIPTION INFORMATION

Each volume, beginning with volume 3, contains at least 512 pages, and consists of an *irregular* number of quarterly issues (rarely an *additional* issue, a Festschrift, may be included in a volume). Each issue of MYCOTAXON varies in number of pages. Subscriptions are normally on a *per volume* basis, but subscribers may choose an *annual* basis to avoid frequent billing. Currently this would involve prepaying three volumes. *Personal subscriptions* are available at a substantially reduced rate for *individuals* who agree not to deposit their copies in another library than their personal one within 3 years of receipt. Address all orders to the Mycotaxon Order Department, *not* to the Editors. Prices beginning with volume 53 are:

	USA	Canada/Mexico	Other Foreign (Air)
REGULAR (multiuser)	$65.00	$67.00 U S	$70.00 U S
PERSONAL (individual)	$30.00	$32.00 U S	$37.00 U S

(*All back volumes are still available.* All *complete* volumes are available at $30.00 per volume when shipped by *surface mail,* $45 per volume by *air mail,* except vols. 1, 34 and 46 available only in runs of 20 or more volumes.)

Place subscriptions through the ORDER DEPT., MYCOTAXON, LTD., P. O. BOX 264, ITHACA, NY 14851-0264, U. S. A., or through your agent. MYCOTAXON may also be obtained on a journal-exchange basis. This may be arranged with journals, institutions, or individuals who have difficulty in obtaining foreign currency.

TWENTY-VOLUME CUMULATIVE INDICES, 1974-1984 & 1984-1991

MYCOTAXON CUMULATIVE INDEX FOR VOLUMES I-XX (1974-1984) by Richard P. Korf & Susan C. Gruff (ISBN 0-930845-00-5) is available at $17.50 *postpaid*, and MYCOTAXON CUMULATIVE INDEX FOR VOLUMES XXI-XL (1984-1991) by Richard P. Korf & Susan C. Gruff (ISBN 0-930845-01-3) is available at $30.00 *postpaid*, MYCOTAXON, LTD., P. O. BOX 264, ITHACA, NY, 14851-0264, U.S.A.

AVAILABILITY IN MICROFORM, TEAR SHEET & PHOTOCOPY

MYCOTAXON is also available in *microfiche* and in *microfilm* from University Microfilms, 300 North Zeeb Road, Ann Arbor, MI 48106, U.S.A., or 30-32 Mortimer Street, London W1N 7RA, England, from whom prices may be obtained.

Tear sheets or photocopies of individual articles may be obtained through *The Genuine Article*™, I.S.I., 3501 Market Street, Philadelphia, PA 19104, U.S.A.

CONTACTING MYCOTAXON'S EDITOR-IN-CHIEF BY E-MAIL OR BY FAX

To reach the Editor-in-Chief regarding manuscripts, you may use this electronic mail INTERNET address: cargill@oeb.harvard.edu or you may FAX to Jean Cargill at (617) 495-9484.

CONTACTING MYCOTAXON'S ORDER DEPARTMENT BY FAX

To reach the Order Department for information or placing orders, you may FAX to Richard Korf at (607) 273-4357.